

Humber Carbon Capture Pipeline

Preliminary Environmental Information Report – Volume 2 – Chapters

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Glossary of Terms and Acronyms

Glossary of Terms

Term	Definition
Technical Terms	
Above Ground Installation (AGI)	An overarching term used to describe the above-ground facilities that form part of the Project. This includes the block valve stations, multi-junctions and Pump Facility. It is used to describe all above-ground structures and equipment within the fenced perimeter of each facility.
(Major) Accident	An event (for instance, train derailment or major road traffic accident) that threatens immediate or delayed serious effects to human health, welfare and/or the environment.
Aerial Photograph/Imagery	A photograph taken using fixed or rotary wing aircraft or satellite which can be used to reveal features within a landscape and aid in assessment.
Affected Road Network (ARN)	Refers to the Primary Route Network (PRN), which designates roads between significant traffic locations across the country. This network is crucial for providing easily identifiable routes for motorists, linking major destinations and ensuring efficient travel. The PRN is managed by local highway authorities.
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.
Air Quality Annual Status Reports (ASR)	Annual reports that provide an overview of air quality conditions in various regions. They assess the presence of key pollutants such as nitrogen dioxide, sulphur dioxide, and particulate matter. The reports detail the strategies employed by local authorities to improve air quality and the progress made towards meeting legal requirements.
Air Quality Management Area (AQMA)	Air Quality Management Areas (AQMAs) are areas that are likely to exceed the national air quality objective for a specific pollutant. They are determined by Local Authorities.

Term	Definition
Air Quality Strategy (AQS)	The Air Quality Strategy for England, Scotland, Wales and Northern Ireland describes the plans drawn up by the Government and the Devolved Administrations to improve and protect ambient air quality in the UK in the medium-term. The Strategy sets objectives for the main air pollutants to protect health. Performance against these objectives is monitored where people regularly spend time and might be exposed to air pollution.
Allocated Minerals Site	A site allocated in the respective Local Authority's Development Plan for minerals resources but is not yet extracted or subject to mineral extraction development.
Ancient Woodland	Woodland that has been continuously in place since at least 1600 AD. Ancient Woodland is divided into ancient semi-natural woodland and plantations on Ancient Woodland sites. Both types are classed as ancient woods.
Applicant	Net Zero North Sea Storage Limited (NZNSSL) is the applicant of the DCO.
Application	The Application for a Development Consent Order (DCO) that is submitted by the Applicant to the Secretary of State (SoS) for the Department of Energy Security and Net Zero (DESNZ).
Appropriate Assessment (AA)	Where a likely significant effect on the integrity of a European site/s cannot be ruled out at the screening stage of a Habitats Regulations Assessment (HRA), an Appropriate Assessment is required to further assess adverse impacts.
Archaeological Interest	There will be archaeological interest in a Heritage Asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
Archaeological Remains	Artefacts or physical evidence of past human activity which have been recovered or discovered as part of archaeological investigation.
Asset (Heritage)	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 asset includes

Term	Definition
	designated heritage assets and assets identified by the local planning authority (including local listing).
Auger boring	A trenchless method of installing a pipeline involving excavating a 'pit' either side of the asset to be crossed which may be supported by concrete rings or sheet piles. An auger would be placed in one pit (launch pit) and used to bore horizontally beneath the feature to be crossed and end at the other pit (reception pit). Sections of the pipe would then be pushed through from the launch pit to the reception pit using equipment that would thrust against the reception pit wall
Average Daily Traffic (AADT)	The total volume of vehicle traffic on a road or highway for a year, divided by 365 days. It is a key measure of road congestion and traffic volume.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level exceeded for 90% of the specified period 'T'.
Baseline	A reference level of existing Environmental Conditions against which a project is measured and controlled.
Baseline Studies	Work done to determine and describe the current Environmental Conditions against which any future changes can be measured or predicted and assessed.
Bedrock Geology	Term used for the main mass of rocks forming the Earth that are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.
Best and Most Versatile (BMV) Land	Land comprising Grades 1, 2 and 3a of the Agricultural Land classification (ALC) system.
Best Practice Measures	Professional procedures that are accepted or prescribed as being correct or most effective to maintain quality.
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.

Term	Definition
Biodiversity Net Gain	An approach to development and/or land management that aims to leave the natural environment in a measurably better state than it was beforehand.
Biotope	An area of uniform environmental conditions providing a living place for a specific assemblage of plants and animals.
Block Valve	Block valves are located at intermediate points along a pipeline and are required for isolation and monitoring of the carbon dioxide or hydrogen pipeline transportation systems. These would include buried pipework, valves, and an instrument building.
Carbon Capture	The capture of anthropogenic carbon dioxide from industrial sources and power stations that would otherwise be emitted into the atmosphere.
Carbon Capture Projects	The industrial facilities for which the Project transports the captured carbon dioxide.
Carbon capture and storage (CCS)	The process whereby anthropogenic carbon dioxide emissions from power stations and industrial facilities are captured at the source before being compressed and transported to be injected under high pressure into depleted oil and gas fields or natural saline geological formations, either onshore or offshore.
Climate Change	The long-term shift in the Earth's weather patterns or average temperature.
Combined Effects	The interaction and combination of different residual (post-mitigation) environmental effects of the Project affecting the same Receptor. For example, visual and noise effects during construction affecting the same residential dwelling.
Connectivity	A measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread.
Conservation Area	An area of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.
Conservation Status	The state of a species or habitat including for example, extent, abundance, distribution and their trends.

Term	Definition
Construction Environmental Management Plan (CEMP)	Document containing the register of environmental actions and commitments setting out methods to avoid, minimise and mitigate impact on the environment and the surrounding area and the protocols to be followed in implementing these measures in accordance with environmental commitments during the Construction Stage.
Construction Exclusion Zone (CEZ)	Part of the construction site from which all pedestrian and vehicle activity is excluded by protective fencing.
Construction Phase/Stage	The phase/stage during which construction works for the Project take place.
Construction Compound	A secure area from which work is managed and resourced, including, but not limited to, temporary offices, workshops, parking, storage areas etc.
Construction Right-of-Way	The strip of land where construction activities take place to install the pipeline. Typically, this includes a trench, a working area, a traffic lane, and space for soil storage. The width of the construction Right-of-Way is dependent on local conditions and is typically different to the width of the Order Limits or the permanent easement.
Cumulative Effects	The effects of the Project in cumulation with other existing development and/or approved development.
Decommissioning	The final process of shutting down the infrastructure comprised in the Project when it is no longer required once it has reached end of life.
Decommissioning Environmental Management Plan (DEMP)	Document containing the register of environmental actions and commitments 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 decommissioning Stage.
Decommissioning Phase/Stage	The period during which an authorised development is decommissioned after the permanent cessation of its operations. This phase includes activities such as planning, regulatory approval, and the removal, disposal, or reuse of installations.

Term	Definition
Designated Heritage Asset	A heritage asset which is protected under legislation such as the Ancient Monuments Act 1979 or the Planning Act 1990. These are nationally important assets which are protected under law.
Development Consent Order (DCO)	Development Consent Order (DCO) is a Statutory Instrument (SI) made by the Secretary of State (SoS) pursuant to the Planning Act 2008 (as amended).
Dewatering	The action of removing groundwater or surface water from a construction site or work area.
Direct Effect	An effect that is directly attributable to the Project.
Discretionary Advice Service (DAS)	An advisory service offered by Natural England for complex development proposals that affect the environment. The DAS offers tailored advice aiming to reduce potential risk, delay and added cost.
District Level Licensing (DLL)	DLL is a type of strategic mitigation licence for great crested newts (GCN) granted in certain areas at a Local Authority or wider scale with the aim of improved conservation outcomes for GCN. Where a DLL scheme is in place, developers can make a financial contribution to strategic, off-site habitat compensation instead of applying for a separate licence or carrying out individual detailed surveys.
Draft Order Limits	The draft of the DCO application's boundary, which includes all areas required for temporary and permanent use by the Project
Drinking Water Protected Area	Catchment areas that influence the water quality for drinking water, which are at risk of failing the drinking water protection objectives.
Dust Management Plan (DMP)	A document that outlines the measures to assess, reduce, and prevent potential dust emissions from a site's operations. The plan includes operational practices to reduce dust generation and engineering controls to prevent dust emissions. It also includes monitoring protocols to ensure dust levels remain within acceptable limits and compliance with regulatory standards.
East Coast Cluster	The East Coast Cluster comprises proposed common offshore infrastructure (to be developed by the Northern Endurance Partnership), and terrestrial infrastructure in each of the Humber and Teesside regions, to decarbonise industry and establish a platform for economic growth. The East Coast Cluster constitutes

Term	Definition
	the Net Zero Teesside, Zero Carbon Humber and Northern Endurance partnerships
Ecological Clerk of Works (ECoW)	Person or persons providing technical advice and managing ecological risks during construction such as measures to protect ecological features, assistance on how to achieve compliance with legislation and managing contractors engaged in providing ecological mitigation.
Ecological Impact Assessment (EclA)	The process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on habitats, species and ecosystems.
Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the ecological feature in accordance with defined significance criteria.
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 prepared by an applicant to provide the information required under the EIA Regulations to request a Scoping Opinion from the Secretary of State.
Engagement	Dialogue with stakeholders on the Project which occurs in addition to the Statutory Consultation required under the EIA Regulations. The dialogue is technical and associated with the topics in the EIA.
Enhancement	Improved management of ecological features or provision of new ecological features, resulting in a net benefit to biodiversity, which

Term	Definition
	is unrelated to a negative impact or is 'over and above' that required to mitigate/compensate for an impact.
Environment Agency	A non-departmental public body sponsored by the United Kingdom government's Department for Environment, Food and Rural Affairs, with responsibilities relating to the protection and enhancement of the environment in England
Environmental Impact Assessment (EIA)	A systematic means of assessing the significance of effects from the Project, undertaken in accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (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.
European Protected Species (EPS)	Plant or animal species receiving full protection under the Conservation of Habitats and Species Regulations 2010 (as amended).
Phase 1 habitat survey	A standardised system for classifying and mapping habitats.
External Influencing Factor	A factor which occurs beyond the limits of the Project that may present a risk to the Project, e.g. if an external disaster occurred (e.g. earthquake, Control of Major Accident Hazards (COMAH) site major accident) it would increase the risk of serious damage to an environmental receptor associated with the Project.
Field Capacity Days (FCDs)	Field capacity refers to the maximum amount of water that a soil can retain after excess water has drained away. It is the point in soil moisture where the soil is saturated but not so much that water is freely draining through it.
Flood Risk Assessment (FRA)	An assessment of the risk of flooding.
Flood Zones	Zones based on the annual probability of flooding from Fluvial and tidal sources, as defined in the Flood Map for Planning. Areas are categorised into one of the following: Flood Zone 1, Flood Zone 2, Flood Zone 3a or Flood Zone 3b.

Term	Definition
Flood Zone 2	This zone 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	This zone 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 where water has to flow or be stored in times of flood.
Fragmentation	Breaking up of, for example, an area of land or habitat resulting in difficulties in accessing or using some or all of that land.
Functionally Linked Land (FLL)	Areas of land or sea outside of the boundary of a European site that may be important ecologically in supporting the populations for which the site has been designated or classified. Occasionally impacts to such habitats can have a significant effect upon the species interest of such sites, where these habitats are considered to be functionally linked to the Site.
Future Baseline	The likely evolution of the baseline without implementation of the Project.
Greenhouse Gas (GHG)	Gases that absorb 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 commonly expressed in terms of 'carbon dioxide equivalents' according to their relative global warming potential. For this reason, the shorthand 'carbon' may be used to refer to GHGs.
Groundwater	Groundwater is the store of water present beneath the Earth's surface in rock and soil pore spaces and in the fractures of rock formations.

Term	Definition
Habitat	The place or type of site where an organism or population naturally occurs. Often used in the wider sense referring to major assemblages of plants and animals found together.
Habitats Regulations Assessment (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European sites, required under the Habitats Directive and Regulations. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.
Health Impact Assessment (HIA)	HIA is a tool to identify and optimise the health and wellbeing impacts of planning.
Heavy Goods Vehicle (HGV)	Vehicles greater than 3.5 tonnes unladen weight.
Heritage	The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions.
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.
Historic England	The government's statutory adviser on the historic environment.
Historic Landscape	The historic landscape is a geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads and waterways, and natural features.
Horizontal Directional Drilling (HDD)	A special steerable drill used to create an arced hole beneath the obstacle being crossed, slightly larger than the pipe. A winch then pulls the pipe through in a string – a long, welded section of pipe assembled onsite.

Term	Definition
Humber Carbon Capture Pipeline (the Project)	The development for which a Development Consent Order (DCO) is sought to cover the terrestrial elements of onshore pipeline infrastructure to transport carbon dioxide. The pipeline system will start in the Drax area in the west and finish at mean low water springs at a landfall location on the Holderness Coast. The Project includes the following: An onshore pipeline system to transport carbon dioxide from industrial and power sector Connected Projects, Humber region. Above Ground Installations including: Pump Facility at the coast north of Easington to increase the pressure of the carbon dioxide for transportation offshore to the storage facility; Pipeline inspection gauge (PIG) traps, strategically located along the pipeline, to ensure pipelines can be cleaned and inspected. Multi-junction installations connecting the mainline pipeline and spur lines to Connected Projects; and Block valves at intervals along the mainline pipeline to allow sections of the pipelines to be isolated for maintenance. A landfall on the coast north of Easington which is the 'landing' point for the offshore carbon dioxide pipeline transportation system so it can connect into the Pumping Facility; this is where the carbon dioxide transportation pipeline infrastructure transitions from the onshore to the marine environment.
Hydrology	The movement, distribution and quality of water throughout the earth.
Impact	A physical or measurable change to the environment attributable to the Project.
Impact Risk Zone (IRZ)	A GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.
Important Ecological Feature (IEFs)	Ecological features requiring specific assessment within EcIA. Ecological features can be important for a variety of reasons (e.g.

Term	Definition
	quality and extent of designated sites or habitats, habitat / species rarity).
Indirect Effect	An effect that results indirectly from the Project, as a consequence of a 'Direct Effect', often occurring away from the Site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effect.
Inert Waste	Waste that will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter that it comes into contact with, in a way likely to cause environmental pollution or harm to human health.
Institute of Air Quality Management (IAQM)	The Institute of Air Quality Management is the professional body for air quality professionals. It occasionally produces guidance that is widely used and accepted by consultants and councils (dependent on the nature of the project).
Internal Drainage Board	Each internal drainage board (IDB) is a public body that manage water levels in an area, known as an internal drainage district, where there is a special need for drainage. They undertake works to reduce flood risk to people and property and manage water levels for agricultural and environmental needs within their district.
Inter-project cumulative effects	The residual (post-mitigation) environmental effects of the Project combining and interacting with the residual environmental effects of committed development(s) affecting the same Receptor. For example, cumulative construction traffic effects upon a residential dwelling from the Project and a proposed housing development.
Inter-tidal zone	The area where the sea/ocean meets the land between high and low tides.
Intra-project combined effects	The interaction and combination of different residual (post-mitigation) environmental effects of the Project affecting the same Receptor. For example, visual and noise effects during construction affecting the same residential dwelling.
Joint Strategic Needs Assessment (JSNA)	A process by which local authorities and health services assess the health, care and wellbeing needs of the community within Local Authority geographic areas.
Junction AGI	An AGI that connects a Spur Line to the Mainline Pipeline, which includes equipment to launch / receive spur line PIGs, with some

Term	Definition
	also including the necessary equipment to launch / receive Mainline Pipeline PIGs
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.
Landfall	The location on the Holderness coast for connection to the offshore pipeline transportation system where the transportation pipeline infrastructure transitions from the onshore to the marine environment.
Land Use	What land is used for, based on broad categories of functional land cover, such as urban and infrastructure use and the different types of agriculture and forestry.
Landscape	Landscape is about the relationship between people and place. It provides the setting for our day-to-day lives. The European Landscape Convention (ELC) defines landscape as “ <i>an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors</i> ”.
Landscape and Visual Impact Assessment (LVIA)	A tool used to identify and assess the likely significant effect 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.
Landscape Character Area	These are unique geographical areas of a particular landscape character type. Landscape character areas take on the names of specific places.
Landscape Character Type	Distinct types of landscape which are generic in character in that they may occur in different parts of the country, but wherever they are they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern.
Lead Local Flood Authority (LLFA)	Lead in managing local flood risks (i.e. risks of flooding from surface water, groundwater and ordinary (smaller) watercourses), ensuring co-operation between the Risk Management Authorities in their area under the Flood and Water Management Act 2010.

Term	Definition
Light Goods Vehicle	Cars and small vans less than 3.5 tonnes gross vehicle weight.
Likely Significant Effect	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.
Limit of Deviation	These limits show the maximum area within which the Project could be installed. This flexibility is required in order to deal with unforeseen circumstances, such as ground conditions and local features such as archaeology.
Listed Building	Building or structure listed by the Secretary of State as being of ' <i>special architectural or historic interest</i> '.
Local Air Quality Management Technical Guidance (LAQM)	A key document for local authorities in the UK, providing necessary tools and frameworks to manage air quality effectively. It is designed to assist local authorities in England in carrying out their duties under Part IV of the Environment Act 1995.
Local Development Plan (LDP)	The set of documents and plans that sets out the local authority's policies and proposals for the development and use of land in their area.
Local Geological Sites (LGSs)	Significant areas that preserve geological features and contribute to our understanding of Earth sciences, designated for their educational, research, and aesthetic value.
Local Nature Recovery Strategy (LNRS)	Local authority strategies that set local priorities for nature recovery with focal area where action to help nature will have the biggest impact.
Local Nature Reserve (LNR)	A site designated by principal local authorities under Section 21 of the National Parks and Access to the Countryside Act 1949.
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 sites selected against local selection criteria for their nature conservation value.

Term	Definition
Made Ground	Areas where the ground surface has been significantly modified by human activity such as embankments and spoil heaps, on the natural ground surface.
Mainline Pipeline	The main section of pipeline, running between Drax Power Station and the future pump station north of Easington, and which Spur Lines connect to.
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 who have powers to carry out flood defence works to Main Rivers.
Main Works Contractor	Appointed to design, plan, manage and monitor the construction phase of the Project and coordinate the various contractors associated with this phase.
Magnitude	A combination of the scale, extent and duration of an effect.
Marine Conservation Zone (MCZ)	A site designated under the Marine and Coastal Access Act (2009) to protect nationally important habitats and species.
Marine Licence	A licence granted under the Marine and Coastal Access Act 2009 by the Marine Management Organisation for applicable works and activities carried out in the marine environment
Marine Management Organisation (MMO)	An executive non-departmental public body created under the Marine and Coastal Access Act 2009 and is sponsored by the Department for Environment, Food and Rural Affairs
Maximum Sound Pressure Level or Maximum Noise Level L_{AFmax}	Maximum sound pressure level occurring within a specified period, with a fast time weighting (0.125 second averaging time).
Mean High Water Springs (MHWS)	The highest-level which spring tides reach on average over a period of time.
Mean Low Water Springs (MLWS)	The lowest level which spring tides reach on average over a period of time.

Term	Definition
Microtunnelling	A trenchless method involving the construction of shafts either side of the asset to be crossed. A microtunnel boring machine is then used to install a concrete microtunnel between the shafts, through which the pipeline is then installed.
Mineral Safeguarding Area	An area designated by Minerals Planning Authorities which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development.
Mitigation Measures	Actions proposed to prevent, reduce and where possible, offset significant adverse effects arising from the whole or specific elements of the Project.
National Character Area (NCA)	Each NCA represents an area of distinct and recognisable character at the national scale. Their boundaries follow natural lines in the landscape, not county or district boundaries. Formally called Area of Outstanding Natural Beauty (AONB)
National Nature Reserve (NNR)	Land declared under the National Parks and Access to the Countryside Act 1949 or Wildlife and Countryside Act (1981) as amended.
National Planning Policy Framework (NPPF)	The document that sets out Government's planning policies for England and how these are expected to be applied.
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.
Nationally Significant Infrastructure Project (NSIP)	Projects which fall under one of the categories in Part 3 of the Planning Act 2008 (as amended) (PA2008).
Nationally Designated Site	Areas of land subject to protection through UK legislation, including Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR).
Natural England	An executive, non-departmental public body acting as the government's adviser for the natural environment in England. Sponsored by the Department for Environment, Food and Rural Affairs

Term	Definition
Net Gain	Measures which are over and above those implemented to reduce the effects arising from development activities.
Nitrate Vulnerable Zone (NVZ)	Areas designated as being at risk from agricultural nitrate pollution.
Nitrogen Dioxide	Combustion processes emit a mixture of nitrogen oxides (NO _x) and primarily nitric oxide (NO) which is quickly oxidised in the atmosphere to nitrogen dioxide (NO ₂). Nitrogen dioxide has a variety of environmental and health impacts. It is a respiratory irritant which may exacerbate asthma and possibly increase susceptibility to infections.
Non-designated heritage asset	A heritage asset which is recorded by the local planning authority on the Historic Environment Record (HER). These assets are protected by planning policy and can be deemed of equal value to designated assets thus earning equivalent protection.
Non-hazardous Waste	Waste that is not inert or hazardous. Includes rubbish or recycling that causes no harm to human or environmental health.
Non-road Mobile Machinery (NRMM)	Any mobile machine, item of transportable industrial equipment or vehicle (with or without bodywork) that is: not intended for carrying passenger or goods on the road and is installed with a combustion engine, either an internal spark ignition petrol engine or a compression ignition diesel engine (e.g. some items of construction equipment).
Northern Endurance Partnership	The Northern Endurance Partnership (NEP) was formed in 2020 as the carbon dioxide transportation and storage company which will deliver the onshore and offshore infrastructure needed to capture carbon from a range of emitters across Teesside and the Humber and transport to offshore storage in the Endurance store. NEP is a collaboration between BP, Equinor, National Grid, Shell and Total. NEP is the public facing “brand” of Net Zero North Sea Storage Limited, the DCO applicant.
Occupational Hazard	A workplace condition that causes a risk to employee health.

Term	Definition
Office for Environmental Protection	An executive non-departmental public body established under the Environment Act 2021. Its primary mission is to protect and improve the environment by holding government and other public authorities to account. Responsible for monitoring and assessing environmental improvement plans, scrutinizing environmental law, advising on changes to environmental law, and enforcing compliance with environmental regulations.
Offshore Environmental Statement	A statement prepared to accompany the application for the Northern Endurance Partnership offshore pipeline that runs to the endurance store. This includes the information that is reasonably required to assess the likely effects of the development.
Open Cut (trenching)	A method of pipeline installation that requires opening up the surface of the ground with a linear trench to the required width and depth for installing a pipeline. It is typically utilised for open countryside or crossings where there are minimal obstacles, for example, narrow roads or tracks with a low volume of traffic.
Operational Phase / Stage	The stage after which the Project is handed over by the relevant construction contractors and approved for operation. It will remain in its Operational Stage until operations cease.
Order Limits	The outer limits for the Project upon which the DCO application is based upon. This includes the area for the pipeline route and any temporary working areas that would be required to install the pipeline, such as access routes, and working compounds.
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 Lead Local Flood Authority (LLFA) or Internal Drainage Board (IDB) where relevant, has powers for Ordinary Watercourses that are similar to those held by the Environment Agency for Main Rivers.
Particulate Matter	Airborne Particulate Matter includes a wide range of particle sizes and different chemical constituents. It consists of both primary components, which are emitted directly into the atmosphere, and secondary components, which are formed within the atmosphere as a result of chemical reactions. Of greatest concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. Air Quality Objectives are in place for the

Term	Definition
	protection of human health for PM10 and PM2.5 – particles of less than 10 and 2.5 micrometres in diameter, respectively.
Patch quality	An approach to ecological management focusing on the quality of discrete habitat patches which contributes to the maintenance of the structure, function and dynamics of the wider ecosystem.
Pathway	Route whereby a hazardous substance may come into contact with the receptor: examples include ingestion of contaminated soil and leaching of contaminants from soil into watercourses.
Peat Soils	Soils comprising predominantly partially decomposed organic material, usually black in colour and waterlogged.
Permanent Access Track	A new permanent track constructed to provide access to each of the Project's Above Ground Installations from the existing road network
Phase 1 Habitat Survey	An ecological survey technique that provides a standardised system to record vegetation and wildlife Habitat. It enables a basic assessment of habitat type and its potential importance for nature conservation.
Pipeline Inspection Gauge (PIG)	A device used for internal inspection, cleaning and monitoring of a pipeline.
PIG Trap	A PIG trap is an above ground horizontally mounted pipework vessel installed at either end of a section of buried pipeline to allow a PIG to be inserted into the pipeline for the purposes of cleaning, monitoring and inspection. A PIG would be launched from a PIG trap at one end of the pipeline and retrieved from a PIG trap at the other end of the pipeline.
Pipe Trench	A method of pipeline installation that requires opening up the surface of the ground with a linear trench to the required width and depth for installing a pipeline. It is typically utilised for open countryside or crossings where there are minimal obstacles, for example, narrow roads or tracks with a low volume of traffic.
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 (SoS).

Term	Definition
Potential Roost Feature (PRF)	A feature within a structure or tree that is suitable to be used by roosting bats.
Potential Significant Effect (See also Likely Significant Effect)	Evidence that an environmental effect assessment may have the potential to be significant
Preliminary Environmental Information Report (PEIR)	The Preliminary Environmental Information Report (PEIR) is the report prepared by the Applicant, containing Preliminary Environmental Information (PEI).
Primary Mitigation	Modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project, and do not require additional action to be taken.
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, Principal Aquifers are aquifers previously designated as major aquifers.
Project	See Humber Carbon Capture Pipeline.
Protective Provisions	Measures included in the DCO to manage the interface between the Project and other assets such as utilities
Proximity Principle	Managing waste as near as possible to its place of production.
Pump Facility	A facility that would pressurise the carbon dioxide for onward transportation to the storage site.
Ramsar Site	A wetland site of international importance designated under the criteria of the Ramsar Convention on Wetlands for containing representative, rare or unique wetland types for their importance in conserving biological diversity.
Reception Pit	An excavated pit to receive the construction equipment used to cross under an obstruction or the pipeline.
Receptor	A component of the natural, created or built environment such as a human being, water, air, a building, or a plant that has the potential to be affected by the Project.

Term	Definition
Recovery	Any operation, the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy.
Recycling	Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes.
Refugia	Artificial objects, primarily of corrugated metal or roofing felt, used in reptile surveys to increase the likelihood of discovering reptiles because they absorb and trap heat offering reptiles an excellent means to gain warmth, while also providing protection from predation and disturbance.
Regionally Important Geological Site (RIGS)	A non-statutory site designated to protect significant places for geology, geomorphology, and soils. Sites are selected for their scientific, educational, historical, and aesthetic features, complementing the network of legally protected Sites of Special Scientific Interest (SSSIs).
Register of Commitments	The Register of Commitments identifies the design, construction and operational commitments included within the Technical Chapters of the Environmental Statement (ES) to address the potential environmental effects of the Project.
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 Project and has the potential to be a Major Accident and/or Disaster subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Rochdale Envelope	The Rochdale Envelope is an acknowledged way of dealing with an application comprising EIA (Environmental Impact Assessment) development, where details of a project have not been fully resolved by the time the application is submitted. The term is used to describe those elements of a project that have not yet been finalised but yet can be accommodated within certain limits and parameters allowing the likely significant effects of a project to be presented in the Environmental Statement (ES) as a worst case. It also provides the opportunity to assess aspects of a development

Term	Definition
	where the detailed design is to be developed post grant of a DCO and approved by the local planning authority under a Requirement.
Scheduled Ancient Monuments (SAMs)	Nationally important archaeological sites that have been designated for protection under the Ancient Monuments and Archaeological Areas Act 1979. Sites include various structures such as standing stones, burial mounds, and remains of monastic buildings, both above and below ground.
Scheduled Monument	'Scheduled monument' means any monument which is for the time being included in the schedule compiled and maintained by the Secretary of State for Digital, Culture, Media, and Sport. This is a designated asset which is protected by the Ancient Monuments Act 1979.
Scoping	An exercise undertaken pursuant to the EIA Regulations, to determine the topics to be addressed within the Environmental Statement (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. These are generally the water-bearing parts of the former non-aquifers. The term 'Secondary Undifferentiated' is also used in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
Secondary Mitigation	Actions that will require further activity in order to achieve the anticipated outcome. These may be imposed as part of the planning consent, or through inclusion in the Environmental Statement (ES).

Term	Definition
Secretary of State (SoS)	In case of the Project, the Secretary of State for the Department for Energy Security and Net Zero (DESNZ).
Setting	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset, and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral.
Severance	The extent to which members of communities or habitats are able (or not able) to move around their community and access services/facilities.
Significance	A measure of the importance or gravity of the effect defined by significance criteria specific to the environmental topic.
Site of Importance for Nature Conservation (SINC)	Sites of Importance for Nature Conservation (SINC) 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.
Soil Carbon	The carbon held within a soil as a result of biological activity and decomposition of organic matter.
Soil Management Plan (SMP)	A document that outlines the steps to be taken to ensure the preservation and protection of soil health during construction, operation, and decommissioning.
Source	Hazardous substance that has the potential to cause adverse impacts.
Source Protection Zone (SPZ)	They are zones which show the level of risk to the abstraction (groundwater) from contamination. This could be from any activity that might cause pollution in the area. For example, storing pollutants like petrol underground, soakaways from septic tanks to the ground. The closer the activity, the greater the risk.
Special Area of Conservation (SAC)	Land designated under the Conservation of Habitats and of Species Regulations 2017 (as amended).

Term	Definition
Special Protection Area (SPA)	Protected areas for birds in the UK designated under the Conservation of Habitats and Species Regulations 2017 (as amended)
Special Landscape Area (SLA)	A designation applied by local authorities to define areas of high landscape importance within their administrative boundaries. Areas recognised for their natural beauty and cultural significance, protected to enhance and preserve the landscapes.
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.
Specific Sound Level, L _s	The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval.
Spur Line	A section of pipeline which runs between emitters and the mainline pipeline.
Statements of Common Ground	A Statement containing factual information pertaining to the Project that is agreed with Statutory Stakeholders.
Statutory Consultation	The Planning Act 2008 (as amended) (PA2008) requires an applicant to undertake public consultation in advance of submitting a Development Consent Order (DCO) application to the Secretary of State (SoS). Statutory consultation must occur with 'statutory consultees and the formal consultation period will normally last for 21 days.
Statutory Consultees	Planning law prescribes circumstances where the Secretary of State (SoS) is required to consult specified bodies prior to a decision being made on an application. Includes bodies such as: Environment Agency, Highways England, Historic England, Natural England, Parish Councils, among others.
Sterilised	Substantially constrain/prevent existing and potential future use and extraction of materials or minerals.
Study Area	Extent to which a particular survey or study applies.
Subsoil	The soil layer(s) below the topsoil where there is less root and invertebrate activity. Often clearly distinguishable from the topsoil due to its colour.

Term	Definition
Subtidal	Areas comprising a mosaic of seabed habitats of rock, sand, mud, and coarse and mixed sediments, supporting a diverse array of organisms.
Superficial Geology	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.
Sustainable Urban Drainage (SuDs)	Sustainable drainage systems designed to manage stormwater locally (as close to its source as possible), to mimic natural drainage and encourage the infiltration, attenuation and passive treatment of surface water runoff.
Temporary Access Track	A track created for temporary use during construction to facilitate vehicle and pedestrian worker traffic
The Environmental Protection UK (EPUK)	A UK legislation that combines a host of environmental regulations aimed at preventing and controlling pollution, governing waste management, and promoting environmental sustainability across England, Wales, and Scotland.
Temporary Works	Those parts of the works that allow or enable construction of the Project and which do not remain in place at the completion of the works proposed.
Tertiary Mitigation	Actions that would occur with or without input from the Environmental Impact Assessment (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.
Topsoil	The upper soil layer which often contains higher levels of organic matter, root growth and invertebrate activity than the lower (subsoil) layers.
Trackout	The transport of dust and dirt from the construction site onto the public road network.
Tree Preservation Order (TPO)	An order made by a Local Planning Authority to protect specific trees, groups of trees or woodlands in the interests of amenity. An Order prohibits certain tree works, damage and destruction of trees without the Local Planning Authority's written consent.

Term	Definition
Trenchless crossing	The crossing by the pipeline of a manmade or natural feature such as watercourse, rail or road by using a construction technique that installs the pipeline beneath the feature without excavating a trench at the ground surface
Vantage Point	A position or standpoint from which something is viewed or considered.
Visual Effect	An effect on specific views and on the general visual amenity experienced by people.
Waste	Any substance or object which the holder discards or intends to discard or is required to discard.
Waste Hierarchy	Sets out the priorities that must be applied when managing waste.
Water Framework Directive (WFD)	European directive which commits member states to achieve good qualitative status of all water bodies.
Water Body/ waterbodies	A discrete body of water forming a physical Feature.
Wetlands	Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.
Working Width	The temporary area within which pipeline construction activities would take place.
Zone of Influence (ZOI)	The areas / resources that may be affected by the changes caused by activities associated with a project.
Zone of Theoretical Visibility (ZTV)	A map, digitally produced, showing areas of land within which, the Project is theoretically visible.

Acronyms

Term	Definition
AA	Appropriate Assessment
AADF	Annual Average Daily Traffic
AADT	Average Daily Traffic
AAWT	Annual Average Weekday Traffic
AGI	Above Ground Installation
AIL	Abnormal Indivisible Loads
ALARP	As Low As Reasonably Practicable
AONB	Area of Outstanding Natural Beauty
ASR	Air Quality Annual Status Reports
ATC	Automatic Traffic Count
AQS	Air Quality Strategy
ARN	Affected Road Network
BNG	Biodiversity Net Gain
BPM	Best Practicable Means
BS	British Standard
BVS	Block Valve Station
CCS	Carbon capture, storage
CDM	Construction (Design and Management)
CEMP	Construction Environmental Management Plan
CEZ	Construction Exclusion Zone
CIEEM	Chartered Institute of Ecology and Environmental Management
CIFA	Chartered Institute for Archaeologists
CL:AIRE	Contaminated Land: Application in Real Environments
CO ₂	Carbon Dioxide
COMAH	Control of Major Accident Hazards
CSCS	Construction Skills Certification Scheme

Term	Definition
CTMP	Construction Traffic Management Plans
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DEMP	Decommissioning Environmental Management Plan
DESNZ	Department for Energy Security and Net Zero
DLL	District Level License
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
ECC	East Coast Cluster
EclA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EIA	Environmental impact assessment
EMF	Electromagnetic Fields
ENVIID	Environmental Impact Identification
EPS	European Protected Species
ERoY	East Riding of Yorkshire Council
ES	Environmental Statement
EUPUK	The Environmental Protection UK
FLL	Functionally Linked Land
FRA	Flood Risk Assessment
GCN	Great Crested Newt
GPDO	General Permitted Development (England) Order
GPS	Global Positioning System
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HAZID	Hazard Identification
HCCP	Humber Carbon Capture Pipeline
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle

Term	Definition
HIA	Health Impact Assessment
HLCP	Humber Low Carbon Pipelines
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
HSWA	Health and Safety at Work etc. Act
HVAC	Heating, ventilation and air conditioning unit
IEFs	Important Ecological Features
IEMA	Institute of Environmental Management and Assessment
ILA	Important Landscape Areas
IRZ	Impact Risk Zone
JNCC	Joint Nature Conservation Committee
LAQM	Local Air Quality Management Technical Guidance
LCC	Lincolnshire County Council
LGS	Local Geological Sites
LNR	Local Nature Reserve
LSE	Likely Significant Effects
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MA&D	Major Accidents and Disasters
MAH	Major Accident Hazard
MHCLG	Ministry of Housing, Communities and Local Government
MHWS	Mean High Water Spring
MLWS	Mean Low Water Spring
MMP	Materials Management Plan
MMO	Marine Management Organisation
MSA	Mineral Safeguarding Area
MWIA	Mental Wellbeing Impact Assessment

Term	Definition
NEP	Northern Endurance Partnership
NHS	National Health Service
NLC	North Lincolnshire Council
NIA	Nature Improvement Areas
NMU	Non-Motorised User
NNIS	Non-Native Invasive Species
NNR	National Nature Reserve
NRMM	Non-Road Mobile Machinery
NPS	National Policy Statement
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project
NSTA	North Sea Transition Authority
NVZs	Nitrate Vulnerable Zones
NZNSS Ltd	Net Zero North Sea Storage Limited
ODN	Ordnance Datum Newlyn
OHID	Office for Health Improvement and Disparities
ONS	Office of National Statistics
PBDE	Polybrominated diphenyl ethers
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report
PFOS	Perfluorooctane sulphonate
PHE	Public Health England
PINS	Planning Inspectorate
PIG	Pipeline Inspection Gauge
PRF	Potential Roost Feature
PRoW	Public Rights of Way
PSR	Pipelines Safety Regulations
PSSR	Pressure Systems Safety Regulations

Term	Definition
PWM	Precautionary Working Method
R2P2	Reducing Risks, Protecting People
RAM	Reasonable Avoidance Measure
RBMP	River Basin Management Plan
REAC	Register of Commitments
RNAG	Reasons for Not Achieving Good
RIGS	Regionally Important Geological Site
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SoCG	Statement of Common Ground
SoS	Secretary of State
SAMs	Scheduled Ancient Monuments
SLA	Special Landscape Area
SMP	Soil Management Plan
SPA	Special Protection Area
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SWMP	Site Waste Management Plan
SuDS	Sustainable Urban Drainage Scheme
TBM	Tunnel Boring Machine
TOC	Total Organic Content
TraC	Transitional and Coastal
TWAO	Transport and Works Order
UAV	Unmanned aerial vehicle
UKHSA	UK Health Security Agency
UXO	Unexploded Ordnance
WeBS	Wetland Bird Survey
WFD	Water Framework Directive

Term	Definition
WLDC	West Lindsey District Council
WHIASU	Welsh Health Impact Assessment Support Unit
ZOI	Zone of Influence

1 Introduction

1.1 Background

- 1.1.1 This Preliminary Environmental Information Report (PEIR) for the Humber Carbon Capture Pipeline Project, has been prepared by Arcadis on behalf of the Applicant. The Humber Carbon Capture Pipeline (HCCP) ('the Project') is being developed by Net Zero North Sea Storage (NZNSS) Limited (the Applicant), which is the promoter entity for the Northern Endurance Partnership (NEP). NEP is an independent joint venture (IJV) with shareholders comprising bp, Equinor and TotalEnergies. NEP was formed to develop the carbon dioxide transportation and storage infrastructure to serve a diverse range of industries in the Teesside and Humber regions.
- 1.1.2 The Project forms part of the East Coast Cluster (ECC) and is crucial to achieving net zero in the Humber, the UK's most carbon-intensive industrial region.
- 1.1.3 The Project comprises a pipeline to transport carbon dioxide (to facilitate carbon capture and storage (CCS)), along with associated Above Ground Installations (AGIs) and a Pump Facility to facilitate transport of the carbon dioxide offshore, where it will be permanently stored within a saline aquifer in the North Sea, known as the Endurance Store.
- 1.1.4 The Project would be built predominantly underground between North Yorkshire and the coast north of Easington in East Riding of Yorkshire, crossing through North Lincolnshire and North East Lincolnshire (see Volume 3 - Figure 1.1: Project Location). At the coast north of Easington, the pipeline would connect to the offshore pipeline to continue the transportation of carbon dioxide to the Endurance Store.
- 1.1.5 The Project encompasses only the onshore works up to Mean Low Water Springs (MLWS) in the intertidal zone at Easington. In the nearshore area, the onshore pipeline would connect to the offshore pipeline, with the offshore pipeline to be consented separately under the Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020.
- 1.1.6 The Project is being designed to connect to selected carbon capture projects along the route. A full description of the Project can be found in Chapter 2: Project Description.

1.2 Legislation and Policy Overview

Requirement for Development Consent Order

- 1.2.1 The Project is defined as a Nationally Significant Infrastructure Project (NSIP) as it meets the criteria of the Planning Act 2008 (the Planning Act), Section 14 (1)(g) and Section 21 (Ref 1.1).
- 1.2.2 As such, the Applicant will seek a Development Consent Order (DCO) from the Department of Energy Security and Net Zero (DESNZ) to construct and operate the Project. The Planning Act states that the Secretary of State is responsible for determining the application for development consent with the power to appoint a single person or a panel from the Planning Inspectorate (PINS) to manage and examine the application. PINS will examine the DCO application for the Scheme and make a recommendation to the Secretary of State who will then decide whether to grant a DCO. If granted, the DCO will provide the necessary authorisation to allow the Project to be constructed.
- 1.2.3 Before submitting an application, applicants have a statutory duty under the Planning Act (2008) to carry out consultation on their proposals.
- 1.2.4 In accordance with the Planning Act (2008), the Applicant is undertaking a formal Section 42 and Section 47 consultation (and issuing Section 48 notices), which will commence at the same time as the publication of this PEIR.
- 1.2.5 The purpose of this PEIR is to enable specialist and non-specialist consultees from the community and consultation bodies to understand the potential environmental effects of the proposed development.

EIA Regulations

- 1.2.6 The Environmental Impact Assessment (EIA) requirement for NSIP developments is transposed into law through the EIA Regulations (Ref 1.2). The EIA Regulations specify which developments are required to undergo EIA and types of projects are listed under either of 'Schedule 1' or 'Schedule 2'. Those developments listed in Schedule 1 must be subject to EIA, while developments listed in Schedule 2 must only be subjected to EIA if they are considered "*likely to have significant effects on the environment by virtue of factors such as its nature, size or location*". Schedule 3 of the EIA Regulations sets out the criteria on which judgement on whether a project is subject to EIA should be made.
- 1.2.7 The Project does not meet the full criteria of Schedule 1 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA

Regulations') (Ref 1.2) as although the pipeline would exceed 40 km, it would not exceed 800 millimetres in diameter (see Chapter 2: Project Description).

1.2.8 Therefore, Schedule 2, paragraph 10 (k) of the EIA Regulations applies:

"10. Infrastructure projects:

(K) oil and gas pipeline installations and pipelines for the transport of carbon dioxide streams for the purposes of geological storage (unless included in Schedule 1 to these Regulations)".

1.2.9 The EIA process is a means of drawing together an assessment of a project's likely significant environmental effects. This helps to ensure that the anticipated effects and proposed mitigation for avoiding, preventing, reducing or offsetting them are properly understood by stakeholders and the determining authority before granting consent.

1.2.10 This PEIR presents the preliminary findings of surveys and assessments to support consultation.

The EIA Scoping Process

1.2.11 The purpose of the EIA Scoping process was to ensure that the 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, the Scoping Report also identified 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 PINS Advice Note Seven (Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements) (Ref 1.3).

1.2.12 The issues that the Applicant considers the EIA needs to address were identified in the EIA Scoping Report (Ref 1.4) submitted to the Planning Inspectorate on 2nd January 2025.

1.2.13 The Planning Inspectorate reviewed and consulted on the EIA Scoping Report and adopted (on behalf of the Secretary of State) a Scoping Opinion on 12th February 2025. The Scoping Opinion included formal responses received by the Planning Inspectorate from statutory consultees.

1.2.14 The matters raised have been reviewed and have been taken into consideration in Chapter 4: EIA Methodology and within the relevant technical assessments described in Chapters 5 – 21.

- 1.2.15 In accordance with Part 14 of the EIA Regulations, the Environmental Statement (ES) will be based upon the most recent EIA Scoping Opinion. However, the exact scope of the EIA will be influenced by the ongoing design evolution of the Project, 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.

National Policy Statements

- 1.2.16 DESNZ published a number of National Policy Statements (NPS) in relation to energy infrastructure in January 2024. The NPSs set out national policy for energy infrastructure and set a framework for the Secretary of State's decisions on applications for such development.
- 1.2.17 The following NPSs are considered relevant considerations in assessing the Project:
- Overarching National Policy Statement for Energy (EN-1) (Ref 1.5), therefore Section 104 of the Planning Act 2008 (Ref 1.1) applies.
 - National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref 1.6).
- 1.2.18 Section 3.5 of EN-1 discusses the need for new CCS infrastructure NSIPs, with paragraph 3.5.1 stating that 'There is an urgent need for new CCS infrastructure to support the transition to a net zero economy' (Ref 1.5). EN-1 further states in paragraph 3.5.2 that CCS is critical to the UK's Net Zero Strategy, Industrial Decarbonisation Strategy and that the International Energy Agency states that CCS is needed in the clean energy transition.
- 1.2.19 Paragraph 3.5.8 of EN-1 makes a specific reference to pipelines, stating that 'To support the urgent need for new Carbon Capture and Storage (CCS) infrastructure, CCS technologies, pipelines and storage infrastructure are considered to be Critical National Priority infrastructure' (Ref 1.5).
- 1.2.20 Section 4.9 sets out the assessment principles for CCS applications. Although most of the section is focused on carbon capture plants, of relevance to the Project is paragraph 4.9.18, which recognises that the infrastructure associated with the three links of CCS (capture, transport and storage) may be brought forward as separate development applications (Ref 1.5).
- 1.2.21 Furthermore, paragraph 4.9.20 recognises that a range of consents from different bodies will be required for CCS infrastructure. The consents

anticipated to be required for the Project are set out later in this PEIR. Paragraph 4.9.20 also reaffirms that onshore pipelines over 16.093 km are classified as an NSIP and require a DCO (Ref 1.5).

- 1.2.22 EN-4 states in paragraphs 1.6.5 - 1.6.9 that the guidance it contains relates only to natural gas infrastructure, and that whilst it does not have effect for carbon capture and storage infrastructure, it may nonetheless contain information that is important and relevant to the Secretary of State's decisions on applications for carbon capture and storage infrastructure (Ref 1.6).

1.3 Purpose, Content and Structure

Purpose and Content of the Document

- 1.3.1 The purpose of this Preliminary Environmental Information Report (PEIR) is to satisfy the requirements of Regulation 12(2) of the EIA Regulations 2017, In accordance with Regulation 12(2)(b), the PEIR presents "the information referred to in Regulation 14(2) which... is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)." The views of consultation bodies and the local community serve to focus and identify specific issues that require further investigation, as well as to inform aspects of the design of the Project.
- 1.3.2 PINS Advice Note Seven, Paragraph 8.4 states: "*A good PEI document is one that enables consultees (both specialist and non-specialist) to understand the likely environmental effects of the Proposed Development and helps to inform their consultation responses on the Proposed Development during the pre-application stage*". With this in mind, this document is intended to give consultees an understanding of the potential environmental impacts of the project and possible mitigation measures to enable them to prepare well-informed responses to consultation. It presents preliminary findings of the environmental assessment work undertaken to date including some environmental baseline data, stakeholder engagement completed, anticipated likely significant effects and preliminary mitigation proposals, based on the current stage of design development.
- 1.3.3 Regulation 14(2) of the EIA Regulations 2017 specifies what environmental information must be included (subject to it being reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects). Table 1-1 identifies where the information defined by Regulation 14(2) can be found within this PEIR.

Table 1-1 – Location within this Document of Information Required by Regulation 14(2)

Information	Location within PEIR
(a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development.	Volume 2 – Chapter 2: Project Description.
(b) a description of the likely significant effects of the proposed development on the environment.	Volume 2 – Chapters 5 – 21.
(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment.	Volume 2 – Chapter 2: Project Description. Volume 2 – Chapter 3: Consideration of Alternatives. Volume 2 – Chapters 5 – 21.
(d) a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment.	Volume 2 – Chapter 3: Consideration of Alternatives.
(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d).	Volume 1 – Non-Technical Summary.
(f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.	The description of the baseline scenario, the future baseline, a description of the factors with the potential to be significantly affected by the development, the methodology and preliminary mitigation measures are contained within Volume 2 – Chapters 5 – 21.

- 1.3.4 Following statutory consultation, the preliminary design will be developed further, addressing comments received throughout the consultation. The Environmental Statement (ES) will present the assessment of the updated design. A precautionary approach has been applied to the assessment undertaken at this stage. The assessment detailed in this PEIR is therefore considered to present a 'worst case' assessment of the extent and impacts of the Project at this stage.

Structure of the PEIR

- 1.3.5 The structure of this PEIR reflects the proposed structure of the ES and covers the assessment topics agreed through the scoping process. The PEIR – and the ES - will be broken down into the following four volumes:

- Volume 1 – Non-Technical Summary.
- Volume 2 - Main Text:
 - Chapter 1: Introduction.
 - Chapter 2: Project Description.
 - Chapter 3: Consideration of Alternatives.
 - Chapter 4: EIA Methodology.
 - Chapter 5: Agriculture and Soils.
 - Chapter 6: Air Quality.
 - Chapter 7: Ecology and Biodiversity.
 - Chapter 8: Climate Resilience.
 - Chapter 9: Greenhouse Gases.
 - Chapter 10: Ground Conditions and Hydrogeology.
 - Chapter 11: Cultural Heritage.
 - Chapter 12: Landscape and Visual.
 - Chapter 13: Noise and Vibration.
 - Chapter 14: Socio-economics, Recreation and Tourism.
 - Chapter 15: Human Health and Wellbeing.
 - Chapter 16: Traffic and Transport.
 - Chapter 17: Materials and Waste.
 - Chapter 18: Hydrology and Land Drainage.
 - Chapter 19: Major Accidents and Disasters.
 - Chapter 20: Coastal Processes.
 - Chapter 21: Cumulative Effects.
 - Chapter 22: Summary.
- Volume 3 – Supporting Figures.
- Volume 4 – Technical Appendices.

- 1.3.6 Each technical chapter of this PEIR details the legislation and policy applicable to the respective assessment at the point of writing this report. An update on applicable legislation and policy will be provided in the Environmental Statement.

1.4 References

- Ref 1.1 – HMSO (2008), *The Planning Act*.c29 [online] Available at: <https://www.legislation.gov.uk/ukpga/2008/29/contents> [Accessed 6 Feb. 2025].
- Ref 1.2 – HMSO (2017) *The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017*. Available at: <https://www.legislation.gov.uk/uksi/2017/572/contents> [Accessed 6 Feb. 2025].
- Ref 1.3 – Planning Inspectorate. (2020). *Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements*. [online] Available at: <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-an/nationally-significant-infrastructure-projects-advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-an> [Accessed 7 Feb. 2025].
- Ref 1.4 – Humber Carbon Capture Pipeline Environmental Impact Assessment Scoping Report (2025) 10607856-ARC-XX-XX-XX-ZZ-0002-A1-Scoping Report
- Ref 1.5 – Department for Energy Security and Net Zero (2023). *Overarching National Policy Statement for Energy (EN-1)*. [online] Available at: <https://assets.publishing.service.gov.uk/media/65bbfbd7c709fe1000f637052/overarching-nps-for-energy-en1.pdf> [Accessed 7 Feb. 2025].
- Ref 1.6 – Department for Energy Security & Net Zero (2023). *National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)*. [online] Available at: <https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf> [Accessed 7 Feb. 2025].

2 Project Description

2.1 Introduction

- 2.1.1 This chapter provides a description of the Project which reflects the current design status. The current design incorporates the feedback on the detail presented on the Project at the Non-Statutory Consultation, as well as changes stemming from further design development and engagement with stakeholders. The design will continue to be refined following Statutory Consultation and any feedback received in line with the Environmental Impact Assessment (EIA) process. The design may also be updated and developed as a result of further site surveys and predictive modelling yet to be undertaken and will be reported within the Environmental Statement (ES).
- 2.1.2 An updated description of the Project will be provided in the ES, reflecting any design changes following this PEIR. This will then be used to complete the assessment and report the likely significant effects on the environment that are predicted to occur as a consequence of the Project. The ES will be submitted with the Development Consent Order (DCO) application currently planned for submission in Q4 2026.
- 2.1.3 Where the design requires flexibility, for example where the draft Order Limits are currently wider to accommodate optionality, the Environmental Impact Assessment (EIA) adopts the principles of the 'Rochdale Envelope' to ensure a robust assessment of the likely significance of the environmental effects. These parameters enable a reasonable worst-case assessment of the potential impacts of the Project to be included in this PEIR. This is further discussed in Chapter 4 – EIA Methodology.
- 2.1.4 A description of the reasonable alternatives that have been considered so far, in the evolution of the design is provided in Chapter 3: Consideration of Alternatives.
- 2.1.5 This chapter is structured as follows:
- **Section 2.2** – explains the context of the Project in relation to the government's wider aims for carbon capture and storage as well as explaining how the Project is part of the government's focus on reducing carbon emissions from key industrial areas in the country.
 - **Section 2.3** – describes the purpose and route of the draft Order Limits.
 - **Section 2.4** – describes the parameters and principles that have shaped the design of the Project.

- **Section 2.5 to Section 2.8** – provides a detailed description of the components of the Project.
- **Section 2.9 to Section 2.11** – describes how the Project would be constructed, operated and ultimately decommissioned.
- **Section 2.12** – presents the references used in this chapter.

2.2 Context of the Project

Carbon Capture and Storage

- 2.2.1 The UK Government have set legally binding net-zero greenhouse gas emissions targets. These include an amendment to the Climate Change Act 2008 to commit the UK to achieving net-zero by 2050 (Ref 2.1).
- 2.2.2 Carbon Capture and Storage (CCS) is critical to the UK's Net Zero Strategy. CCS is a process which removes carbon dioxide (CO₂) emissions from industrial processes and power generation and transports them to secure storage areas.

The East Coast Cluster

- 2.2.3 The East Coast Cluster (ECC), which serves the industrial powerhouse regions of Teesside and the Humber, has been selected as one of the first two CCS clusters to be taken forward by the UK Government. It includes a diverse mix of projects, including industrial carbon capture, low-carbon hydrogen production, negative emissions power, and power with carbon capture. These technologies are essential for the UK to meet its net zero targets; both regions would also benefit from an influx of green jobs, skills development and supply chain benefits.
- 2.2.4 Net Zero North Sea Storage Limited, via Northern Endurance Partnership (NEP), is progressing the Humber Carbon Capture Pipeline ('the Project'), a proposed onshore infrastructure project that would transport CO₂ from carbon capture projects in the Humber region to secure offshore storage under the North Sea.
- 2.2.5 NEP, with shareholders made up of bp, Equinor and TotalEnergies, would be the CO₂ transportation and storage infrastructure provider for the ECC.
- 2.2.6 The Project is an important part of NEP's end-to-end CO₂ transportation and storage infrastructure network.

- 2.2.7 The Project comprises a new onshore pipeline network to transport captured CO₂ from industrial and power generation facilities in the Humber region to the coast north of Easington. At this point, the Project would interface with an offshore pipeline that would deliver the continuation of the CO₂ transportation pipeline to secure subsea storage. As set out in Chapter 3: Consideration of Alternatives, the industrial and power generation facilities to be connected by the pipeline are those shortlisted by Department for Energy Security and Net Zero (DESNZ) in the cluster sequencing decision taken in August 2022.
- 2.2.8 The Humber Carbon Capture Pipeline (HCCP) is an essential part of CCS in the Humber region and would provide the onshore transportation of the captured CO₂ from several industrial sites. CO₂ would then be transported via an offshore pipeline and permanently stored underground in offshore stores held by NEP. These include Endurance (CS001) and expansion stores (CS006, CS007 and CS025).
- 2.2.9 The offshore pipeline, infrastructure and storage are all subject to separate applications for consent / license under the respective offshore oil and gas regulations but also form part of the ECC. A separate application has been made for part of the NEP offshore infrastructure (connecting Teesside with the secure subsea storage saline aquifer) and this was supported by an Offshore ES (Ref 2.2). The NEP Offshore ES included the assessment of the potential environmental impacts of the offshore Humber pipeline. It is anticipated that a separate application to consent the offshore Humber pipeline transportation infrastructure will follow in due course.

2.3 The draft Order Limits

- 2.3.1 The draft Order Limits are illustrated in Volume 3 - Figure 1.1: Project Location and in Volume 3 - Figure 2.1: Key Features of the Project and extend from north of the village of Drax in North Yorkshire and the coast north of Easington in the East Riding of Yorkshire.
- 2.3.2 The draft Order Limits have been designed to enable a connection to industrial areas across the Humber region and to link to carbon capture projects that were shortlisted by the DESNZ in the cluster sequencing process in August 2022 (Ref 2.3).
- 2.3.3 At the eastern extent, the draft Order Limits extend as far as the Mean Low Water Springs (MLWS) north of Easington. This area would serve as the interface between the Project and the offshore CO₂ transportation pipeline and infrastructure. The separate application for the offshore pipeline and

infrastructure would extend up to the Mean High-Water Springs (MHWS), to provide an 'overlap' with the Project's draft Order Limits.

- 2.3.4 Easington was identified as the landfall point due to the greatest construction and execution predictability with established precedents, the reduced cost, and the greater understanding of the environmental constraints. Further information around the landfall connection point is presented in Chapter 3.
- 2.3.5 The draft Order Limits represent the maximum extent of the Project's temporary and permanent works, as far as is defined at the current design stage. Temporary works can be defined as an engineered solution used to facilitate the construction of permanent works. Once the construction works are completed, they are removed. Permanent site works are the structure that is the permanent part of the design and are designed to last for the entire lifespan of the Project. The draft Order Limits will be larger than the permanent works requirement, to facilitate the construction of the Project.
- 2.3.6 Temporary and permanent working areas include:
- The area required for installing the pipeline and for two fibre optic cables running the length of the proposed pipeline, which will be underground once construction is completed.
 - The area required for installing Above Ground Installations (AGIs) and the Pump Facility, with the footprint of the AGIs and Pump Facility to be permanently taken.
 - The area required for constructing permanent access tracks to the AGIs and the Pump Facility.
 - Temporary working areas, including the proposed locations for temporary construction compounds and temporary access tracks (that cross private land);
 - Areas for highway works such as surfacing works, widening and / or the creation of passing places and diversions. These may be temporary diversions and permanent access widening.
 - Areas to allow for utility connections for the AGIs and Pump Facility, including a power cable to connect the Pump Facility to an existing substation near Salt End. These are likely to be temporary, where the utilities connections will be installed underground.
 - Areas currently identified for mitigation for potentially adverse environmental effects. These may include:
 - Changes to land drainage are anticipated on surface water, both temporarily during construction and permanently.

- Permanent landscape planting to mitigate visual impacts of AGIs and the Pump Facility.
- Permanent habitat creation and / or improvement to provide Biodiversity Net Gain for the Project.

- 2.3.7 The draft Order Limits reflect the current stage of design, incorporated within this PEIR submission, and will be refined as the design matures. Design amendments will take into account responses to the Statutory Consultation, stakeholder feedback and the findings of environmental surveys and assessments. The ES will report on the Order Limits that will form the DCO application.
- 2.3.8 The draft Order Limits have been developed following extensive engineering, environmental and safety considerations, including:
- Providing a feasible route to connect to carbon capture projects in the Humber region.
 - Public, construction and operational safety.
 - Planning, environmental and land use constraints.
 - Engineering, constructability and cost.
- 2.3.9 The draft Order Limits also considered the consultation feedback that was received following the Project's Non-Statutory Consultation that was held 9th July – 20th August 2024. Furthermore, the development of the design and draft Order Limits has also considered the feedback previously received in relation to the Humber Low Carbon Pipelines (HLCP) project in 2022 (as discussed Chapter 3).
- 2.3.10 Relevant feedback included comments regarding assessment methodology, and the sensitivity and value of environmental receptors common to both projects. This feedback has been considered as relevant background to inform the design development of the Project, given aspects of similarity between the type of infrastructure proposed and some common route areas. The Applicant will continue to undertake thorough engagement with all stakeholders to gather feedback on the Project which will be used to help inform the design, the EIA and the DCO application.
- 2.3.11 Private residential dwellings have been excluded from the draft Order Limits. This exclusion results in the appearance of small 'cut-outs' of the draft Order Limits, as can be seen in Volume 3 - Figure 1.1: Project Location.

- 2.3.12 For reporting purposes, the Project has been divided into three geographic sections numbered 1 to 3, as described below and illustrated in Volume 3 - Figure 2.1: Key Features of the Project.
- 2.3.13 At this design stage, the draft Order Limits are typically a minimum of 300m wide. However, some areas, such as near Drax, are wider to allow for design development and accommodate design optionality for the pipeline.

Section 1

- 2.3.14 Section 1 extends from the village of Drax to the east bank of the River Trent. The draft Order Limits cross through three Local Authorities in this section, commencing from the northern extent in North Yorkshire, crossing into the East Riding of Yorkshire and then entering North Lincolnshire.
- 2.3.15 From the west, the draft Order Limits begin to the north of the village of Drax and the east of the village of Barlow. Two possible locations for an AGI are identified in the area; one of which falls within the boundary of Drax Power Station, the other in the agricultural fields to the east. Only one of these AGIs will be selected. The draft Order Limits continue east and include the area south of Long Drax.
- 2.3.16 The draft Order Limits also include an area east of the River Ouse, south of Barmby on the Marsh. The draft Order Limits remain wide in this area to allow for potential alternate routeing of the proposed pipeline and to provide flexibility within the design. Should the land to the north of the River Ouse be used for the routeing of the pipeline, the pipeline would cross the river using the HDD technique, before turning southwards and crossing under the river for a second time. The pipeline would emerge from the trenchless crossing in the agricultural fields.
- 2.3.17 Two existing private access tracks are included within the draft Order Limits in the area north of the River Ouse to provide options for temporary access. These are Station Lane leading to Gateland Field Lane, and Holycroft Lane.
- 2.3.18 The draft Order Limits continue south, remaining wide to facilitate flexibility in the pipeline design. The draft Order Limits continue in a southerly direction, crossing Church Dike Lane and traversing the agricultural fields in a southwesterly direction until they meet the A645, which will be crossed using trenchless techniques.
- 2.3.19 Continuing south from the south side of the A645, the draft Order Limits pass to the west of Rawcliffe and under the River Aire and the Wakefield and Goole

railway line. The River Aire will be crossed using HDD, with an entrance pit to the north of the river and an area to the north of the entrance pit. The draft Order Limits then remain wide to facilitate potential options to the south of Mill Lane and the River Aire. The existing roads of Mill Lane, Wheels Lane and Ings Lane may require minor works to allow temporary access during construction.

- 2.3.20 The draft Order Limits continue south through the agricultural fields before crossing the A614 and then stay in a southerly direction through the agricultural fields until it meets the M62.
- 2.3.21 The draft Order Limits continue in a southeasterly direction and are expected to cross the Aire and Calder Navigation canal, the Dutch River (River Don), and the M18 in a single trenchless crossing. The exit pit for this crossing would be in the field directly adjacent to the M18, with pipeline stringing to take place to the east.
- 2.3.22 South of Rawcliffe Bridge, the draft Order Limits continue east, with the next AGI located within the agricultural fields north of Moor Road. The draft Order Limits then cross the Sheffield to Hull railway line where they then continue through the agricultural area known as 'Goole Fields'. An existing access track is included in the draft Order Limits from Thorne Road, south of Rawcliffe Bridge, which would provide temporary access during construction as well as permanent access to the AGI during operation. Further east, several more existing tracks are included in the draft Order Limits to provide options for temporary access during construction.
- 2.3.23 South of Swinefleet, the draft Order Limits and the proposed pipeline continue east. Immediately east of Swinefleet Warping Drain, an AGI will be located within the agricultural field. At this point, a section of the route (hereafter referred to as a spur line) branches away from the main pipeline and runs southeast, crossing the A161 between Crowle and Eastoft, to provide a connection to carbon capture projects in the Keadby area. This section of the route is hereafter referred to as the Keadby Spur Line. Meanwhile, the main section of the draft Order Limits continues eastwards through agricultural fields, also crossing the A161 north of Eastoft. The draft Order Limits and the proposed pipeline continue east to the River Trent, running between Adlingfleet and Garthorpe.

Section 2

- 2.3.24 Section 2 is situated predominantly within North Lincolnshire, however there is a small area of the draft Order Limits which extend into North East Lincolnshire at the southeastern extent of Section 2.
- 2.3.25 From the crossing of the River Trent, the draft Order Limits commence eastwards between Walcot and Burton upon Stather, avoiding the area known as Alkborough Flats, a Local Wildlife Site. Two existing roads - Tee Lane and Coleby Road are included as they may require modification to support construction traffic. The draft Order Limits pass south of Coleby, crossing Coleby Road.
- 2.3.26 The draft Order Limits remain wide in this area to allow for the consideration of optionality in the pipeline design. The draft Order Limits remain south of West Halton and include the Winterton Landfill. It is currently intended that the pipeline would be routed to the north of the landfill. If the pipeline needs to cross the landfill, it would do so using trenchless techniques to take the pipeline underneath the landfill.
- 2.3.27 The pipeline would then connect to an AGI in the agricultural field directly north of the A1077 between Winterton and Winteringham. The draft Order Limits continue eastwards, cross the A1077 and pass to the south of South Ferriby where they cross New River Ancholme. The draft Order Limits remain wide here to accommodate optionality in the pipeline routeing through the agricultural fields and to pass beneath the New River Ancholme and the East Drain using trenchless techniques.
- 2.3.28 An existing track from Sluice Road is included in the draft Order Limits to provide temporary access during construction, before they cross the B1204.
- 2.3.29 Continuing eastwards, the draft Order Limits cross the B1218 and the A15 using trenchless techniques. An existing access track from the B1218, near the A15 crossing on the east side, is included in the draft Order Limits to provide temporary access during construction. An area east of Bonby is included in the draft Order Limits as a potential location for a temporary construction compound. The corridor then crosses the B1206, where it then diverges from a multi-junction AGI.
- 2.3.30 A spur line continues to the south, passing to the west of Thornton Curtis, Wootton and Ulceby to allow connection to carbon capture projects near

Croxton (hereafter referred to as the Croxton Spur Line). An AGI is proposed in the agricultural field between the B1211 and the A180.

- 2.3.31 The main extent of the draft Order Limits and the proposed mainline pipeline continue east from the multi-junction AGI, crossing the A1077, Barton Line railway and passing south of Goxhill and Southend, with an AGI proposed within the agricultural fields north of College Road.
- 2.3.32 West of East Halton, the draft Order Limits diverge. A spur line runs south to include a temporary construction compound west of South Killingholme and allows connection to carbon capture projects in the North Killingholme and South Killingholme area (hereafter referred to as the Killingholme Spur Line). The draft Order Limits and proposed pipeline run south, to the north of North Killingholme, with an AGI proposed east of North Killingholme. The proposed spur line then crosses Church Lane and continues south to South Killingholme. The draft Order Limits continue west, to the south of North Killingholme, before turning south across the A1077 and then east across the A160 between South Killingholme and Immingham. A 'search area' for an AGI is proposed to the south of Faulding Lane. This area falls into North East Lincolnshire. Land to the North of Ulceby Road is included as a potential site for a temporary construction compound.
- 2.3.33 From the west of East Halton, the draft Order Limits continue north to the River Humber, east of Goxhill. The draft Order Limits remain wide here to accommodate construction access and to provide flexibility in design in a flood-prone area.
- 2.3.34 An area of the existing port of Killingholme is included in the draft Order Limits as a potential location to site a construction compound. Several existing roads are also included in the draft Order Limits as options are being considered for construction traffic routes.
- 2.3.35 The draft Order Limits then cross the River Humber. The proposed pipeline would cross the River Humber either using HDD or in a tunnel.

Section 3

- 2.3.36 Section 3 is situated within the East Riding of Yorkshire.
- 2.3.37 The draft Order Limits continue from the River Humber's north bank, with the proposed crossing beneath the existing mud flats either using HDD or in a tunnel.

- 2.3.38 The corridor immediately diverges, with a spur line running north between Paull and Thorngumbald to allow for connection to carbon capture projects near Salt End (hereafter referred to as the Salt End Spur Line). The draft Order Limits extend into the Salt End Chemicals Park to the Salt End South Substation. Two AGIs are proposed on the north and south banks of Hedon Haven, one of which falls within Salt End Chemical Park. Only one of these options will be required. An area for a temporary construction compound is included to the south of Main Street, Paull.
- 2.3.39 From the crossing of the River Humber, the draft Order Limits continue east running south of Thorngumbald, Keyingham and Ottringham. South of Thorngumbald, the draft Order Limits form two corridors, the north of which is to only capture areas potentially required to support temporary works associated with crossing the River Humber. The draft Order Limits then cross the A1033 between Patrington and Winestead, where the draft Order Limits widen to facilitate optionality and a potential temporary construction compound.
- 2.3.40 An AGI is proposed to be located in the agricultural fields to the north of Wakefield Lane. Holmpton Road is included within the draft Order Limits to facilitate access to the construction swathe.
- 2.3.41 The draft Order Limits continue further east to the Holderness coast north of Easington and to Mean Low Water Springs. They include an area which may be required to create a temporary access route to the beach to facilitate construction works.
- 2.3.42 Offshore works beyond the extent of the draft Order Limits are assessed in the NEP Offshore ES (Ref 2.2). An assessment of the potential cumulative effects of the offshore works is considered in Chapter 21 - Cumulative Assessment.

2.4 Design Parameters of the Project

- 2.4.1 The minimum design life of the Project is 25 years. At the end of this period, the infrastructure will be assessed and the Project reviewed. Depending on that review, decommissioning will be as per Section 2.11.
- 2.4.2 The design pressure for the pipeline and AGIs is 150barg, with the maximum allowable operating pressure being 136barg.
- 2.4.3 The maximum operating temperature for the pipeline is 40°C.

- 2.4.4 A Leak Detection System (LDS) in the form of a Fibre Optic Cable running parallel to the pipeline would be implemented to monitor the pipeline system and would alert the operator to potential leaks.
- 2.4.5 Safety is at the heart of HCCP Project and would be the primary consideration at every step of design, construction, operation, and decommissioning. We are committed to protecting people through strict adherence to the highest safety standards and all relevant regulations, as well as the rigorous application of safe practices across all activities. This includes the safety of all people directly affected by the Project, including local communities and Project personnel, as well as the safety of all people who may be indirectly affected, such as road users on access routes and personnel at supplier facilities. All Project personnel, including designers, workers, and managers will systematically monitor and review key safety performance metrics, ensure safety processes are in place, and strive for continuous improvement.

2.5 The Carbon Dioxide Transportation Pipeline

- 2.5.1 The pipeline would be built out of carbon steel and adhere to the standards and requirements of British Standards Institution Published Document PD 8010-1 Pipeline Systems – Steel Pipelines on Land (Ref 2.4) and ISO 13623 - Petroleum and natural gas industries – Pipeline transportation systems (Ref 2.5) and DNV-ST-F101 – Submarine pipeline systems (Ref 2.6) for the section of pipeline seaward of the Pump Facility.
- 2.5.2 The pipeline would be approximately 66 cm in diameter. The pipeline for the spur lines to carbon capture projects would be up to approximately 30 cm in diameter.
- 2.5.3 The pipeline would be underground throughout the extent of the Project, at approximately 1.2 m below the surface. Only small sections of the pipeline within the boundary of some AGIs would be above ground, to allow for operational maintenance access and monitoring.
- 2.5.4 The pipeline is designed to transport up to 17 million tonnes of CO₂ per year. The pipeline would transport CO₂ from carbon capture projects in dense phase (a highly compressed fluid that demonstrates properties of both liquid and gas).

2.6 Above Ground Installations

- 2.6.1 The above ground installations (AGIs) are facilities required to operate and maintain the pipeline.

- 2.6.2 The AGIs would be designed in accordance with ASME B31.3 (Ref 2.7) and PD8010-1 (Ref 2.4).
- 2.6.3 The AGIs would be strategically located along the pipeline, relating to proximity to potential connections and intervals along the pipeline length. The proposed locations of the AGIs are shown in Volume 3 - Figure 2.1 – Key features of the Project and are discussed below. Chapter 3 discusses selection further.
- 2.6.4 Three types of AGIs are proposed:
- **Inlet AGIs** – would serve as the connection point from the carbon capture projects to the pipeline. These facilities would contain equipment for remote monitoring of the pipeline system and would also contain equipment to launch / receive a Pipeline Inspection Gauge (PIG) which is used to internally clean, gauge and inspect the pipeline.
 - **Junction AGI** – would connect a spur line to the main pipeline. These facilities would contain equipment to launch / receive a PIG for inspection of the spur line. Some Junction AGIs would also contain the necessary equipment to launch / receive PIGs on the main pipeline.
 - **Block Valve Stations AGI** – would allow the isolation and monitoring of the pipeline. These would include buried pipeline valves and a small section of above ground pipework. In addition, a Block Valve Station would include an electrical and instrumentation unit.
- 2.6.5 All AGIs would be operated remotely. Inspection and maintenance visits would be required during operation.
- 2.6.6 The size and arrangement of each AGI would be dependent upon its location and function.
- 2.6.7 All types of AGIs would have the following features and characteristics in common:
- Security fencing (up to approximately 2.4 m high) and access points denoting the perimeter of the facility, to ensure no unauthorised access. The security fencing would have a minimum of two emergency exits.
 - A permanent access track up to 4m wide from the existing road network to allow vehicular access for security and maintenance visits. Where practicable, existing access tracks would be used. Some may require upgrading, such as widening or levelling. For other locations, new access tracks may be constructed and would typically be of a stone aggregate surfacing, or concrete for short access tracks.

- Vehicle parking and turning provision adjacent to or within the AGI facility.
- Pedestrian access points for security and maintenance personnel, including emergency exit points.
- An electrical and instrumentation (E&I) unit that would house the necessary equipment for distributing power to the AGI facility. The E&I unit would be raised via steel leg supports, or similar, above the 1:100 year + climate change allowance flood level. At this stage, it is assumed that the maximum height of the E&I kiosks will be 4.5m (4m equipment height placed upon a finished pad level which is assumed to be raised by 0.5m above existing surface level), however the exact height will be determined following completion of ongoing design work and will be reported in the ES.
- Security and safety lighting, to ensure sufficient lighting for any maintenance or security visits during hours of darkness, and to operate should there be a security breach or emergency. The lighting design is currently in development; however, it is anticipated that lighting would only operate during the aforementioned events and would not operate permanently.
- Associated infrastructure, such as pipework and valves, instrumentation and sensors and electrical transformers.
- A single, small heating, ventilation and air conditioning (HVAC) unit would be required to maintain suitable operating temperature and conditions within the E&I unit. The HVAC systems would be of a typical arrangement similar to what is used for offices or apartments i.e. an indoor blower and an external wall-mounted condenser and pump which would operate continuously. It is anticipated that the HVAC system at each AGI would have a power rating of approximately 3kW and a noise emission rating of approximately 50dbA.
- A telecommunications connection to the dedicated fibre optic cable which would run along the pipeline.
- A power supply taken from nearby existing electricity distribution infrastructure. Supply to each facility would be via a buried cable or overhead line. At this stage, no additional towers or poles will be required.
- The ground within the AGIs would be surfaced with a combination of concrete surfacing for areas required to support equipment and access, with the remaining area surfaced with crushed aggregate material to provide permeability for surface water.
- A landscape planting scheme associated with each AGI to integrate the facility suitably into its surrounding landscape (discussed further in Chapter 12 – Landscape and Visual Impacts).

- The surface of the AGIs would be predominantly permeable (i.e. gravel) and therefore surface water infiltration is anticipated. However, each AGI would have surface water drainage system that follows the sustainable urban drainage scheme (SuDS) hierarchy.

2.6.8 Table 2-1 below describes the characteristics of each AGI.

Table 2-1 – Characteristics of each AGI

AGI Name	AGI Type	Approx. footprint (metres)	Figure number (Volume 3)	Description of location
Section 1				
Drax AGI	Inlet AGI	110m x 80m	Figure 2.1 – Key Features of the Project, page 1	Option 1 The Drax AGI is located within North Yorkshire, in the Long Drax Parish area. Option 1 for the AGI is proposed to lie within the northern parcel of Drax Power Station. Access would be gained via the existing internal access roads of the Power Station, with minor extensions to facilitate movement within the AGI site. Immediately to the east is existing woodland and agricultural land. The proposed Option 1 location is not within an environmentally designated site. Option 1 is 400m southwest from Drax Priory Scheduled Monument and is not within 500m of any residential properties. Carr Dike, an ordinary watercourse, is approximately 20m south of the AGI site. Option 2 The Drax AGI is located within North Yorkshire, in the Long Drax Parish area. Option 2 for the proposed AGI is approximately 120m north of the northern boundary of the existing Drax Power Station. Access would be gained via a proposed approximately 300m permanent access track from New Road, which runs parallel to the eastern boundary of Drax Power Station. Option 2 for the Drax AGI is proposed to be sited in an agricultural field. Immediately to the south and west are existing woodlands. To the north is the ordinary watercourse Carr Dike. The proposed Option 2 for the Drax AGI location is not within an environmentally designated site. The Drax Priory Scheduled Monument is approximately 200m north. The nearest residential property is Drax Abbey Farm approximately 450m to the northeast.
Rawcliffe Bridge AGI	BVS	80m x 70m	Figure 2.1 – Key Features of the Project, page 2	Rawcliffe Bridge BVS is located within the East Riding of Yorkshire, in the Rawcliffe Parish area. The proposed location is approximately 1.2km southeast of the Rawcliffe Bridge village. The proposed location is within an area of open agricultural fields. Access would be via using and / or upgrading an existing access track off Thorne Road. The proposed Rawcliffe Bridge BVS is not within an environmentally designated site. The nearest residential property is approximately 750m northwest.
Eastoft AGI	Junction	115m x 140m	Figure 2.1 – Key Features of the Project, page 3	The proposed Eastoft AGI is located within the East Riding of Yorkshire, in the Twin Rivers Parish area. The location of the proposed AGI is approximately 2.3km northwest of the village of Eastoft, within an agricultural field surrounded by similar land uses. Approximately 450m east is an existing wind farm. The Eastoft AGI would be accessed via the creation of an access track from Quay Lane. The proposed Eastoft AGI is not within an environmentally designated site. The nearest residential property is approximately 250m east.
Keadby AGI	Inlet AGI	100m x 90m	Figure 2.1 – Key Features of the Project, page 4	The proposed Keadby AGI is located within North Lincolnshire, in the Keadby with Althorpe Parish area. The proposed location is within an agricultural field, bounded to the north by Eastoft Moors Drain Ordinary Watercourse and an existing access track associated with an existing wind farm to the south. The infrastructure associated with the existing Keadby Power Station is approximately 340m southeast. Access would be gained by using and / or upgrading the existing track from Chapel Lane which is associated with the existing wind farm.

AGI Name	AGI Type	Approx. footprint (metres)	Figure number (Volume 3)	Description of location
				The proposed Keadby AGI is not within an environmentally designated site. The nearest residential property is approximately 860m northeast.
Section 2				
Winterton AGI	BVS	80m x 70m	Figure 2.1 – Key Features of the Project, page 6	The proposed Winterton AGI is located in North Lincolnshire, in the Winteringham Parish area. The location and the surrounding area are agricultural fields. Access would be via a proposed permanent track from the minor road off the junction of Earls Gate Road and Mere Lane Street. The proposed Winterton AGI is not within an environmentally designated site. The nearest residential property is approximately 500m south.
Barrow AGI	Junction	100m x 90m	Figure 2.1 – Key Features of the Project, page 6	The proposed Barrow AGI is located in North Lincolnshire, in the Barrow upon Humber Parish area. The location and the surrounding area are agricultural fields. Access would be via a new access point off the B1206. The proposed Barrow AGI is not within an environmentally designated site. The nearest residential property is approximately 550m west.
Croxton AGI	Inlet AGI	100m x 90m	Figure 2.1 – Key Features of the Project, page 9	The proposed Croxton AGI is located in North Lincolnshire, in the Croxton Parish area. The location is within an agricultural field. The B1211 road is adjacent to the south, beyond which is the existing Melton Ross quarry. Access would be via a new access point off the B1211. The proposed Croxton AGI is not within an environmentally designated site. The Yarborough Camp Scheduled Monument is approximately 500m northwest. The nearest residential property is approximately 500m east.
East Halton AGI	Junction	115m x 140m	Figure 2.1 – Key Features of the Project, page 11	The proposed East Halton AGI is located in North Lincolnshire, in the East Halton Parish area. The location and the surrounding area are agricultural fields. Access would be via a new permanent access track from College Road. The proposed East Halton AGI is not within an environmentally designated site. The Thornton Abbey Scheduled Monument is located approximately 230m south. The nearest residential property is approximately 250m southwest.
Killingholme AGI	Inlet AGI	100m x 90m	Figure 2.1 – Key Features of the Project, page 11	The proposed Killingholme AGI is located in North Lincolnshire, in the South Killingholme Parish area. The location is within an agricultural field. To the east lies Eastfield Road, beyond which is the existing Lindsey Oil Refinery. Access would be gained via Church Lane, which lies adjacent to the south. The proposed Killingholme AGI is not within an environmentally designated site. The Manor Farm moated site Scheduled Monument is located approximately 350m North West. The Church of Saint Denys Grade I Listed Building is located 400m west. The nearest residential property is approximately 180m west.
Immingham AGI	Junction	90m x 90m	Figure 2.1 – Key Features of the Project, page 11	The proposed Immingham AGI would be located in North East Lincolnshire, in the Habrough Parish area. A ‘search area’ for the AGI has been defined, with the AGI proposed to sit within this area. The ‘search area’ is within an agricultural field. To the east is Mayflower Woods, and beyond this to the north is the southern extent of the Humber Refinery. The proposed permanent access track is still in development, however options existing to create a new track from Baptist Chapel Lane, Faulding Lane or Killingholme Road. The proposed Immingham AGI is not within an environmentally designated site. The nearest residential property is approximately 250m west.

AGI Name	AGI Type	Approx. footprint (metres)	Figure number (Volume 3)	Description of location
Section 3				
Thorngumbald AGI	Junction	115m x 140m	Figure 2.1 – Key Features of the Project, page 12	The proposed Thorngumbald AGI is located in the East Riding of Yorkshire, in the Paull Parish area. The location is within an agricultural field. To the east is Newlands Lane, from which a new permanent access track would be constructed. The proposed Thorngumbald AGI is not within an environmentally designated site. The nearest residential property is approximately 300m southeast.
Salt End AGI	Inlet AGI	100m x 90m	Figure 2.1 – Key Features of the Project, page 12	Option 1 Option 1 for the proposed Salt End AGI is located in the East Riding of Yorkshire, in the Paull Parish area. The location is within the existing Salt End Chemicals Park, on the southern boundary and adjacent the River Humber and Hedon Haven Main River. Option 1 for the proposed Salt End AGI is not within an environmentally designated site. The Humber Estuary Ramsar, Special Protection Area (SPA), Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) is approximately 40m to the south. Access to the AGI would be gained via the existing internal access roads of the Salt End Chemicals Park. Option 2 Option 2 for the proposed Salt End AGI is located in the East Riding of Yorkshire, in the Paull Parish area. The location is within an agricultural field; however the surrounding area is subject to a consented outline planning application by a third-party developer for a mixed-use and industrial development known as Humber International Enterprise Park. To the north is Hedon Haven Main River, beyond which is the existing Salt End Chemicals Park. The River Humber is further to the west. Access would be gained via a new permanent track from Main Street. Option 2 for the proposed Salt End AGI is not within an environmentally designated site. The Humber Estuary Ramsar, Special Protection Area (SPA), Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) is approximately 30m to the west and north. The nearest residential property is approximately 350m southeast.
Patrington AGI	BVS	80m x 70m	Figure 2.1 – Key Features of the Project, page 14	The proposed Patrington AGI is located in the East Riding of Yorkshire, in the Welwick Parish area. The location is within an agricultural field, which is common with the surrounding area. Access would be gained via an access point from Wakefield Lane. The proposed Patrington AGI is not within an environmentally designated site. The nearest residential property is approximately 320m east.

2.7 The Pump Facility

- 2.7.1 A facility (referred to as a Pump Facility) is proposed north of Easington in the East Riding of Yorkshire (see Volume 3 - Figure 2.1: Key Features of the Project).
- 2.7.2 The Pump Facility would increase the pressure of the CO₂ to enable onward transportation to the offshore subsea storage site.
- 2.7.3 The Pump Facility would be located near to the proposed landfall point – where the onshore and offshore pipeline would interact. The Greater Wash Special Protection Area (SPA) and Dimlington Cliff Site of Special Scientific Interest (SSSI) are approximately 330 m east (see Chapter 7: Ecology and Biodiversity for further information).

Table 2-2 – Pump Facility Option Descriptions

Option 1	Option 2
The Pump Facility would be situated within the agricultural field to the north of the existing Perenco Gas facility, to the south of the existing wind turbines. This utilises the prevailing northeasterly winds to disperse any CO ₂ during venting operations.	The Pump Facility would be situated within the agricultural fields to the west of the existing Perenco Gas facility. This moves the Pump Facility further from Dimlington Cliffs.

- 2.7.4 Full descriptions of the two options are available within Volume 4 - Appendix 2.1: Pump Facility Optioneering.
- 2.7.5 The Pump Facility would be permanently staffed by approximately four people. Occasionally, there may be a need for approximately 19 additional people to temporarily work at the Pump Facility to support key operation and maintenance tasks. This would include activities such as meter calibrations, instrument and electrical routines, grounds maintenance, rigging and lifting of plant, fabric maintenance and major pump overhaul. Such key operation and maintenance tasks would be scheduled to maximise efficiency, such as potentially being undertaken simultaneously, wherever practicable.
- 2.7.6 It is anticipated that the power supply for the Pump Facility would be via a connection to the existing Salt End South Substation, north of the existing Salt End Power Station within the Salt End Chemicals Park, as this is the closest

substation to the Pump Facility with sufficient capacity. The connection is anticipated to comprise a buried cable. The draft Order Limits extend beyond the Salt End AGI to provide a corridor through Salt End Chemicals Park to allow for the power cable to be installed in this area. From the Salt End AGI to the Pump Facility at Easington, the cable would be buried and run parallel to the pipeline, within the draft Order Limits. The separation distance between the pipeline and the power cable is not yet known but will be designed to ensure that the two assets do not interfere with one another.

- The Pump Facility would comprise the following features and characteristics: Connect to Warmer Lane via a permanent access track (including surface water drainage). The vehicle tracks within the Pump Facility would be a maximum of 6m wide
- Perimeter security fencing (up to approximately 2.4 m high) with secure vehicle and pedestrian access points. The security fence would have a minimum of two emergency exits.
- A single-story administration building and control room (approximately 5 m high roof line).
- A workshop (approximately 8 m roof line).
- Welfare building.
- Provision for vehicle parking and turning within the Pump Facility.
- Launch / receiver equipment for PIGs.
- Up to five pump electrically driven units each rated 3.75 MW (four would be operational normally, one on standby). The pump units would be approximately 2.7 m high and would be contained within a structure to attenuate the noise emissions. The pump units would also have local vents, to support maintenance activities and unplanned emergency events.
- Up to five CO₂ recycle coolers, including pressure relief valves.
- A vent up to 8m in height and 2 in diameter to release a flow of CO₂ from the pump seals. This would be at an approximate rate of 240 Normal (N) litre / min, which is equivalent to 76 tonnes per annum or 0.000447% of the design flow rate of the pipeline.
- One emergency diesel generator which is anticipated to be used as back-up power for communications and instrumentation only (i.e. would not operate routinely), should there be issues with receiving electricity from the grid network.
- One Uninterruptable Power Supply (UPS) system to provide low voltage power to critical control and instrumentation equipment in the unplanned emergency event that both the main power supply and the emergency diesel generator are unavailable.

- Lighting which would operate during low-light conditions to allow the on-site workers to undertake their tasks safely and would operate during any security or emergency situations.
- HVAC systems.
- Electrical and instrumentation units which would house the necessary equipment for distributing power to the Pump Facility.
- Associated infrastructure, such as pipework and valves, instrumentation and sensors and electrical transformers.
- The Project's dedicated fibre optic cable that would run the length of the pipeline route and connect to the AGIs would terminate at the Pump Facility control room (see section 2.8 below).
- A landscape planting scheme to integrate the facility suitably into its surrounding landscape.
- An arrangement for managing surface water runoff which will follow the sustainable urban drainage scheme (SuDS) hierarchy.

2.7.7 It is anticipated that a short section of an existing wooden-pole overhead electricity distribution line and a section of an existing field drain would require diverting to accommodate the Pump Facility, north of Easington. The diversions would be designed to be as close to their original location as practicable whilst minimising potential adverse impacts.

2.8 Other Assets

Fibre Optic Cables

2.8.1 Up to two fibre optic cables would be installed throughout the length of the pipeline and connect to the AGIs and the Pump Facility.

2.8.2 This would provide a dedicated and secure means of telecommunication connection for the Project components and allow the Project to be monitored by the operator. The fibre optic cable would also act as the Leak Detection System for the Project, allowing early identification in the unlikely event of a leak in the system.

Cathodic Protection System

2.8.3 A Cathodic Protection (CP) system would be installed, associated with the buried pipeline.

2.8.4 The purpose of the CP system would be to protect the pipeline from external corrosion once it is buried and operating.

- 2.8.5 The design of the CP system is still in progress; however, it is anticipated that an Impressed Current Cathodic Protection system would be used. This would primarily consist of:
- A cabinet containing a transformer rectifier and an anode ground bed, which are anticipated to be located within each AGI and the Pump Facility.
 - Test posts located at accessible locations at intervals along the pipeline (such as at field boundaries, where access is convenient), to support the monitoring of the CP system once operational. Test posts are similar to common pipeline marker posts but have electrical connections at the back to allow measurements.

Pipeline Marker Posts

- 2.8.6 Marker posts would be installed at regular intervals along the pipeline to provide a visual indication of its presence once reinstatement is completed and the pipeline is buried and operating.
- 2.8.7 The pipeline marker posts would typically be installed at field boundaries and / or adjacent to roads, watercourses or other crossings to ensure they are clearly visible and minimise disruption to land uses.
- 2.8.8 The pipeline marker posts would also display information relating to the pipeline, including service description and emergency contact details.
- 2.8.9 Some marker posts would be paired with aerial marker posts, which would allow inspecting the pipeline easement from the air. Aerial marker posts would be typically located at significant changes in direction of the pipeline route and where visibility from the air is good.

2.9 Construction of the Project

- 2.9.1 The construction phase is the physical process of building and all other associated activities such as site clearance, soil stripping and site set up, through the building and the installation of the pipeline, AGIs and Pump Facility, to the final landscaping and testing of the pipeline prior to the beginning of operation.

Pre-construction Activities

- 2.9.2 Ahead of construction, the pipeline route would be surveyed and marked / 'pegged' out in consultation with the landowners / occupiers. This would denote the precise alignment, particularly in relation to field boundaries and

environmentally sensitive sites. Wherever practicable, existing gaps in hedgerows and between mature trees would be used for routing the pipeline.

- 2.9.3 The area required for the pipeline construction works (known as the 'construction working width') would also be demarcated. Engagement with landowners would be undertaken, as appropriate.
- 2.9.4 Any required pre-commencement surveys would also be undertaken.
- 2.9.5 The location and detail of existing land drainage systems would be established, based on information from landowner liaison, drainage surveys and intrusive investigation. Where necessary, and subject to agreement with the landowner / occupier, new field drains would be installed to:
- Enable the landowner / occupier's current drainage system outside of the construction working area to continue working throughout the construction phase.
 - Replace existing drains damaged within the construction working area.
 - Help prevent damage to the soil structure.
 - Aid / accelerate soil structural recovery following completion of the construction activity.
 - Ensure the site work areas are kept as dry as practically possible.
- 2.9.6 The design of these new drainage schemes will be agreed with the landowners / occupiers. A record of the land drainage locations, including records of connections to existing drains, would be produced. Surveys and engagement with landowners would be undertaken prior to construction to understand and document the status and condition of any existing drainage systems in place, prior to construction works commencing.
- 2.9.7 Where necessary, utility diversions would be undertaken prior to construction works commencing, such as the over-head electricity distribution line near the Pump Facility.
- 2.9.8 Relevant consents and permits required to enable construction works to commence as part of the DCO pre-commencement requirements would also be obtained from the respective issuing authority and engagement with stakeholders would be undertaken, as necessary.
- 2.9.9 Where required, bio-security measures would be implemented through liaison with the Department for Environment, Food and Rural Affairs (Defra's) Animal Health and Veterinary Laboratories Agency.

Temporary Construction Compounds

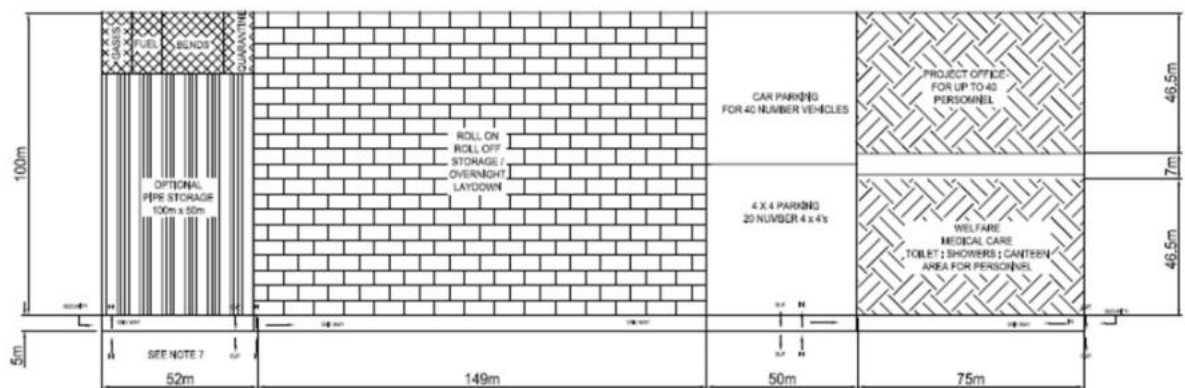
- 2.9.10 Temporary construction compounds would be required to support the construction works. Compounds would be used for the storage of construction materials (including pipe), equipment as well as site office facilities.
- 2.9.11 The compounds would be established prior to commencing pipeline construction works. 11 locations for temporary construction compounds are proposed and are shown in Volume 3 - Figure 2.1 – Key Features of the Project. This includes a 'Search area for temporary construction compound' at the port of Killingholme, whereby discussions are ongoing with landowners and operators in this area to identify and agree upon whether an area of existing hardstanding can be used as a temporary construction compound.
- 2.9.12 The size and arrangement of each temporary construction compound would vary, depending on the extent and type of construction work it would serve. However, each temporary construction compound would typically include the following features / characteristics:
- Perimeter security fencing (i.e. Heras-style or equivalent).
 - A temporary access point and / or track from the existing road network. This is anticipated to involve a combination of using existing suitable tracks (and potentially upgrading) or constructing new tracks which would typically be of crushed aggregate.
 - Areas of temporary surface within the temporary construction compound. This may include compacted gravel, wooden bog-matts, reinforced rubber or aluminium track panels or asphalt. The material chosen would be dependent upon ground conditions and other variables and would be determined via engagement with landowner/s. Areas of the temporary construction compounds may be required to be concrete over the stone sub-base, in heavily trafficked areas.
 - Security and safety features such as temporary lighting. Lighting would be designed, positioned, and directed to reduce the intrusion into adjacent properties and habitats, used in shifts and at the lowest luminosity necessary for safe delivery of each task.
 - Installation of temporary drainage solutions, where necessary. At this stage, it is assumed that infiltration trenches will be required to encourage absorption of run off into the ground. Pre-development run off rates will be maintained, with run off management techniques employed in line with Sustainable Drainage Systems (SuDS) principles.
 - Vehicle access and parking area.
 - Temporary Office and welfare facilities.

- Materials and waste storage and handling areas.

2.9.13 The proposed temporary construction compounds are likely to be one of the following typical types:

Type 1 Temporary Construction Compound

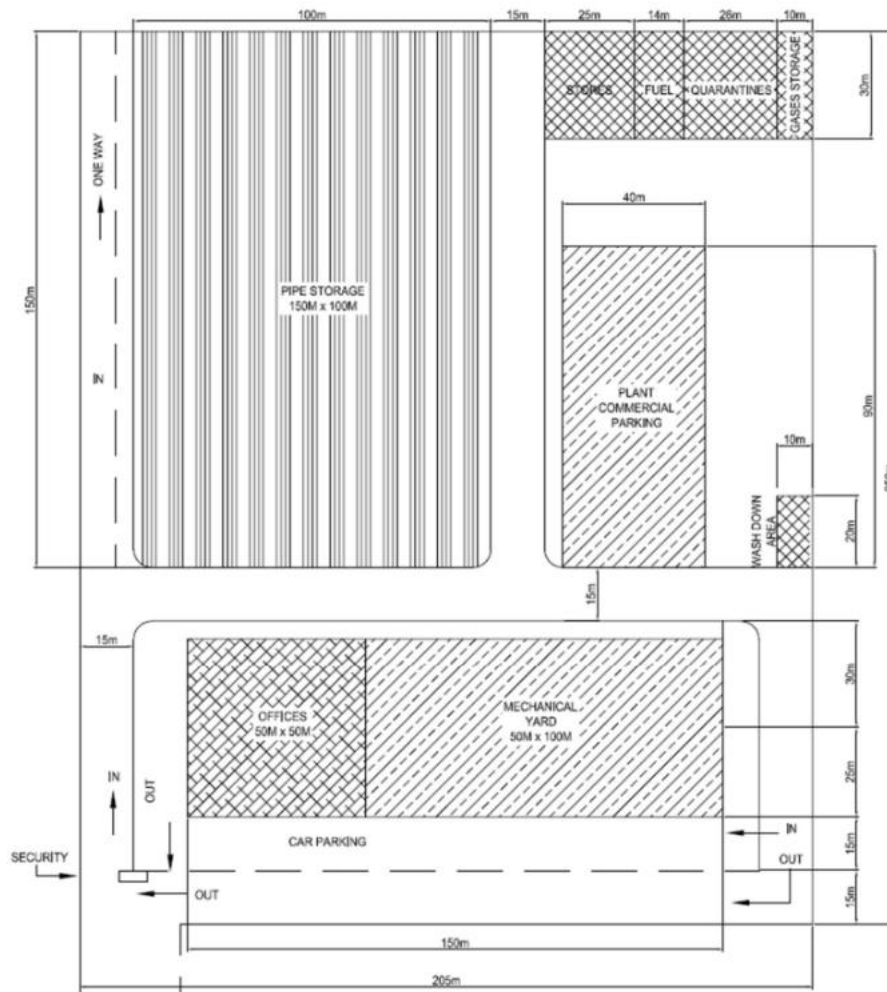
2.9.14 The type 1 temporary construction compound would be a major operating yard intended to support pipeline construction activities primarily through the provision of office and welfare facilities, with additional land allocated for temporary storage / laydown of construction plant, bulk materials and line pipe. A type 1 compound may serve as the main site office for the construction contractor. A typical layout of a type 1 temporary construction compound is provided in Insert 2-1 below:



Insert 2-1 – Typical Layout of a Type 1 Temporary Construction Compound

Type 2 Temporary Construction Compound

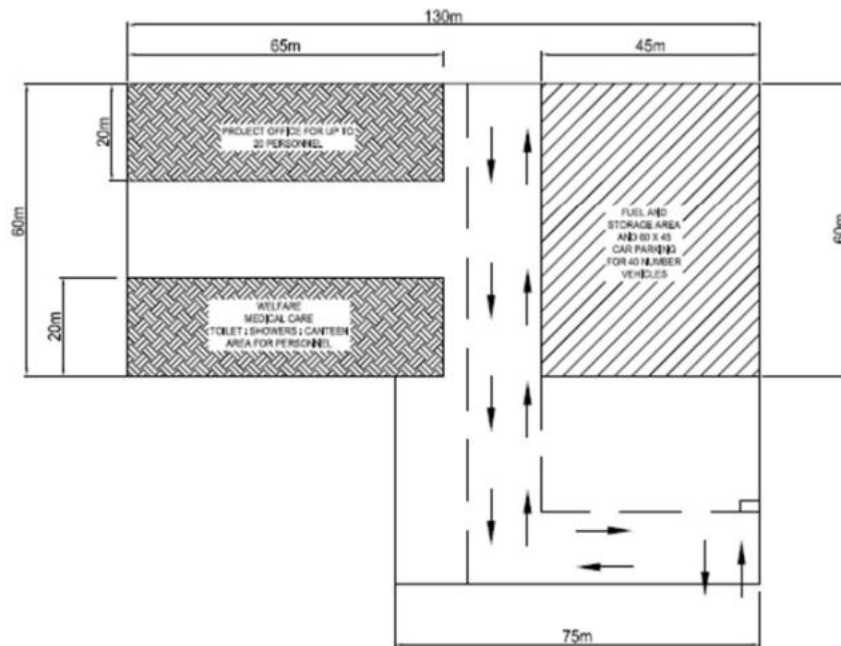
2.9.15 The Type 2 temporary construction compound is a major operating yard intended to act as a general construction yard to support pipeline construction, with additional land allocated for temporary storage / laydown of construction plant, bulk materials and sections of pipeline. A typical layout of a type 2 temporary construction compound is provided in Insert 2-2 below:



Insert 2-2 – Typical Layout of a Type 2 Temporary Construction Compound

Type 3 Temporary Construction Compound

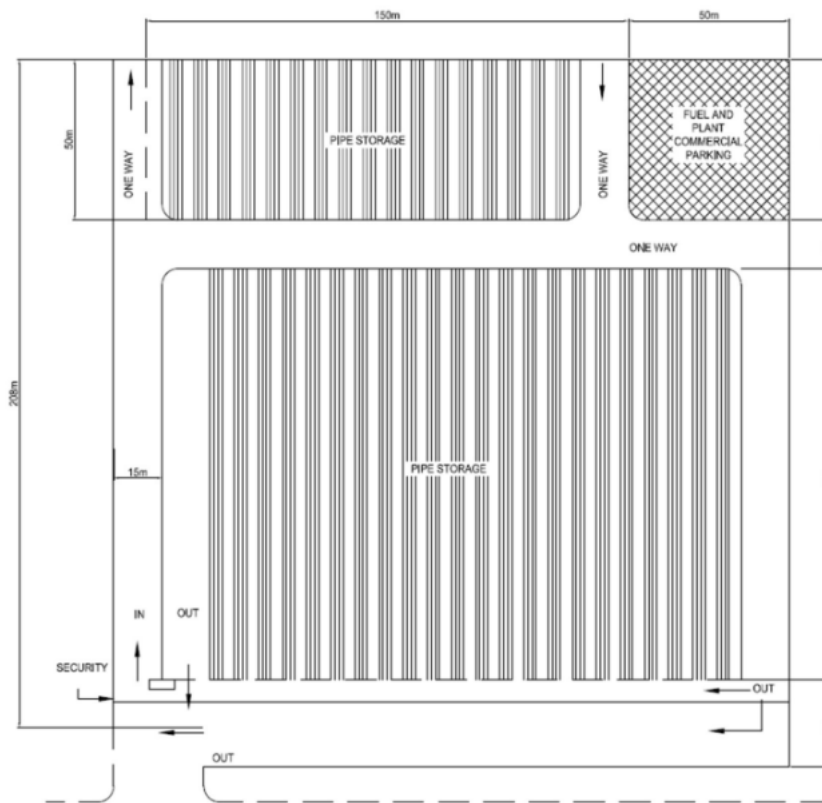
- 2.9.16 The Type 3 temporary construction compound is intended to act as a general office, welfare and parking facility to provide local support to pipeline construction activities. It is envisaged that these comparatively smaller construction compound types would be required at regular intervals and locations of prolonged construction access, such as major trenchless crossings, within the draft Order Limits and typically at the access point from public highways. A typical layout of a type 3 temporary construction compound is provided in Insert 2-3 below:



Insert 2-3 – Typical Layout of a Type 3 Temporary Construction Compound

Type 4 Temporary Construction Compound

- 2.9.17 The Type 4 temporary construction compounds are intended primarily to act as a pipe storage facility, providing a space to allow for the bulk storage of sections of pipeline and components associated with large lengths of pipeline construction. As a minimum it is anticipated that a single Type 4 compound will be required for each construction section, with the potential for additional pipe stores of similar or smaller size to allow for localised storage of sections of pipe where construction access to the pipeline corridor is limited. A typical layout of a type 4 temporary construction compound is provided in Insert 2-4 below:



Insert 2-4 – Typical Layout of a Type 4 Temporary Construction Compound

Temporary Construction Compound Locations

2.9.18 The proposed locations of the temporary construction compounds shown in Volume 3 - Figure 2.1 – Key Features of the Project have been identified following consideration of:

- Locating compounds as close as practicable to the construction works.
- Ensuring the surrounding road network and access are suitable for the anticipated type and volume of construction vehicles.
- The size of the land parcel is suitable for the size of the proposed temporary compound.
- The characteristics of the land parcel are suitable, such as land use and gradient.
- Avoid locations with key environmental sensitivities, such as designated environmental sites.

2.9.19 Table 2-3 below sets out the details of the proposed temporary construction compounds. At this stage of the Project, the design includes optionality for the number and locations of temporary construction compounds to allow flexibility.

- 2.9.20 This will be reviewed and potentially refined as the design matures. An update on the number and locations of proposed temporary construction compounds will be provided in the ES.

Table 2-3 – Temporary Construction Compounds

Route section	Temporary construction compound name	Type	Approximate size (ha)	Main purpose
1	Drax TCC	4	2.8	Sized to act as a Type 1, 2 or 4 compound. Intended as a major compound to support mainline pipeline construction.
1	Keadby TCC 1	1	2	Project office, yard and pipe storage. Size to accommodate works for the Keadby spur
1	Keadby TCC 2	4	2.8	Sized to act as a Type 1, 2 or 4 compound. Major temporary construction compound and pipe store, sized to accommodate storing materials needed for Section 1 works
1	Eastoft TCC	4	2.8	Intended for use as temporary laydown to support pipeline construction for Section 1 works
2	Winterton TCC	4	3	Sized to act as a Type 1, 2 or 4 compound. Major temporary construction compound and pipe store, to accommodate storing materials needed for constructing the main pipeline in Section 2
2	Beaumontcote TCC	4	8.5	Sized to act as a Type 1, 2 or 4 compound. Major temporary construction compound and pipe store, to accommodate storing materials needed for constructing all the main pipeline in Section 2 and the spur pipelines to Croxton, Killingholme and Immingham
2	Humberside Airport TCC	1	1.8	Project office and yard only (Type 1).

Route section	Temporary construction compound name	Type	Approximate size (ha)	Main purpose
2	Immingham Docks TCC	4	5.9	Intended as a temporary construction compound and pipe store, sized to accommodate the storage of all pipeline required for the Project, assuming arrival by port.
2	South Killingholme TCC	4	4.7	Intended as an alternative to Immingham Docks.
3	Salt End TCC	4	2.1	Sized to act as a Type 1, 2 or 4 compound. Major temporary construction compound and pipe store, sized to accommodate storing materials needed for constructing all the main pipeline in Section 3 and the spur pipeline to Salt End
3	Winestead Temporary Construction Compound (TCC)	3	2.6	Sized to act as a Type 1, 2 or 4 compound. Major temporary construction compound, to accommodate storing materials needed for constructing all the main pipeline in Section 3

- 2.9.21 Where temporary construction compounds and / or temporary access tracks interact with existing landowner accesses or Public Rights of Way, temporary measures would be put in place, such as diversions, to accommodate the continued use of these routes.
- 2.9.22 The temporary construction compounds are anticipated to be required for the duration of the construction phase (discussed in more detail later in this section). In addition to the temporary construction compounds shown in Volume 3 – Figure 2.1 – Key Features of the Project, further temporary working areas would likely be required to serve specific works, such as the construction of AGIs or where major pipeline crossings are proposed. These temporary construction compounds would typically be smaller and required for a shorter duration than those currently identified and would be located within the draft Order Limits. The River Humber crossing may require temporary construction compounds for a longer duration due to the complexity of the works.
- 2.9.23 Depending on the ground conditions and levels of each temporary compound area, some topsoil stripping and profiling of the ground may be required to establish a safe and effective temporary working area. Following the completion of the construction works, all temporary construction compounds would be disassembled, and the ground conditions restored to their former use or as designed and consented.

Construction Vehicle Movements

Heavy Goods Vehicle Movements

- 2.9.24 A summary of the total anticipated Heavy Goods Vehicle (HGV) movements for the construction phase are set out in Table 2-4. Movements are estimated per working day through the construction phase, per access point across the whole route, and assume the use of TBM for the construction of the River Humber crossing, as this represents the largest construction traffic numbers.

Table 2-4 – Anticipated HGV Movements

Result	Year 1 (2029)	Year 2 (2030)	Year 3 (2031)	Year 4 (2032)	Year 5 (2033)	Year 6 (2034)	Full Construction Phase Total
Number of working days	251	313	313	314	313	129	1,633
Average annual daily movements	92	356	260	162	28	52	172
Average weekly movements	544	2,136	1,554	952	162	302	21,028
Peak weekly movements	1,082	4,800	3,872	1,948	348	348	4,800
Average monthly movements	2,298	9,280	6,734	4,192	690	1,310	4,450
Peak monthly movements	3,534	18,288	13,968	6,836	1,566	1,566	18,288
Total Movements	22,974	111,346	80,790	50,302	8,272	6,550	280,234

Abnormal Indivisible Load Movements

- 2.9.25 The requirement for Abnormal Indivisible Loads (AILs) would be dependent upon the specification of equipment and machinery chosen by the construction contractor/s. However, an indicative summary of anticipated AIL movements throughout the construction phase is provided in Table 2-5 below.

Table 2-5 – Indicative Number of AIL Movements during the Construction Phase

Component with the potential to be classified as AIL	Quantity of two-way AIL movements
Key components	
Tunnel Boring Machine – Cutter Head	1
Tunnel Boring Machine – Shield	1
Tunnel Boring Machine – Machine Can	1
Tunnel Boring Machine – Tail Shield	1
CO ₂ Pump Cooler	5
CO ₂ Pump	5
Total	14

River Humber Crossing Works Construction Vehicle Movements

- 2.9.26 The works to facilitate the River Humber crossing are anticipated to be a key contributor to the number of construction vehicle movements required by the Project, as it is the longest trenchless crossing required for the Project, and therefore requires specialist equipment. A construction compound will be required on both the north and south sides of the River Humber, with an entry pit and hardstanding for the drilling / tunnelling machinery on the south side, and a reception pit and hardstanding for the machinery on the north side.
- 2.9.27 Access construction estimates are carried out assuming access via Goxhill (Ferry Road) and East Halton (Skitter Road) on the south of the river, and via Dark Lane to the north of the river.
- 2.9.28 A comparison of the anticipated HGV movements associated with both the Tunnel Boring Machine (TBM) and Horizontal Directional Drill (HDD) methods

(discussed further later in this section) are set out in Table 2-6, in relation to traffic generated in respect to north and southern sides of the River Humber. This considers movements associated with the crossing construction only.

Table 2-6 – Comparison of Anticipated HGV Movements for River Humber Crossing Methods

	HDD	TBM
Number of Construction days	278	1,251
Average HGVs Daily	11	16
Peak HGVs Daily	76*	52
Total HGVs	2,938	19,726

*Future optimisation of construction schedule may allow for short-term peaks to be reduced.

Construction Access and Traffic Routes

- 2.9.29 During the construction phase, temporary access to the construction working areas would be required from the public highway network. Some of these accesses would also be required for permanent access during the operation and maintenance phase to allow for routine maintenance and inspection of the AGIs and Pump Facility (see Section 2.10 for further information).
- 2.9.30 Temporary construction access locations are proposed throughout the draft Order Limits and are shown in Volume 3 - Figure 2.1 – Key Features of the Project.
- 2.9.31 A total of 165 access points have been identified at the current stage of design development, of which 13 access points are assumed to be maintained permanently for operational access.
- 2.9.32 The process for identifying construction traffic routes and access points has considered:
- Using the shortest route from the location of access points to the Strategic Road Network (SRN), comprised generally of motorways and major A roads.
 - Incorporating and accounting for input and feedback provided to date as part of landowner and stakeholder engagement.
 - Using A roads as a priority, then B roads, then C roads and then unclassified roads as far as possible.
 - Avoiding existing highways containing constraints such as weight-restricted bridges or low height bridges.

- Avoiding single-carriageway roads unless these provide direct access to a construction area without a viable alternative.
- Avoiding dangerous or poorly suited intersections.
- Avoiding settlements and sensitive receptors such as schools and other high-risk locations.
- Minimising the impact on villages and towns from construction traffic, construction noise and visual impacts.
- Minimising the impact on sensitive road users, including the perceived safety, minimising road and PRow diversion and amenity impacts.
- Ensuring there is at least one viable HGV access route to each lock out point of the pipeline construction corridor. Lock out points occur due to constraints such as major roads, Main Rivers or other similar features which will be crossed by the pipeline via a trenchless installation technique or via a reduced working width (discussed further below), meaning that construction vehicles need to travel ‘around’ the feature.

2.9.33 The type and quantity of vehicles associated with a given access location are expected to vary significantly depending on the associated construction activities.

2.9.34 The final specific access arrangements for temporary construction access will be agreed with the relevant local highway network authorities during detailed design so that detailed measures at each access can be agreed. Post-construction, temporary construction access will be removed or reinstated to existing layouts and condition (or as otherwise agreed).

2.9.35 All site access would be provided with appropriate fencing to ensure that work sites are secure. Some access would be available to all vehicle types, whilst others may be restricted to the construction workforce and light vehicles only.

2.9.36 All site accesses would be designed to eliminate the risk of vehicles queuing back onto the public highway by providing sufficient width close to the adjacent highway appropriate to the types of vehicles anticipated to use the access.

Construction Traffic Routes

2.9.37 The preliminary construction traffic routes are shown in Volume 3 - Figure 2.1: Key Features of the Project and have been split into:

- Major access routes – To be used as the primary HGV access route (in combination with the pipeline construction working width) for pipeline construction activities.

- Minor access routes – To be used for Light Goods Vehicles (LGV) / car traffic, as well as a minority of HGV traffic in pipeline construction, and trenchless crossing construction activities. Minor access routes generally follow narrow single lane tracks, roads of poor condition, or roads with a notable impact on nearby villages and towns and sensitive receptors. These roads are poorly suited for large volumes of HGV traffic but may be used on occasion in a supporting role to major access routes, such as to reduce haulage of materials along the construction working width.

2.9.38 There are several notable locations which present a challenge regarding routing construction traffic. The proposed approach to each location is described below, and the routes shown in Volume 3 - Figure 2.1: Key Features of the Project.

North of the River Aire

- 2.9.39 The region of pipeline construction between the River Ouse and the River Aire has notably challenging access.
- 2.9.40 Access is available to the north of the A645 through the centre of Drax village, while to the south access is available through either Carlton or Newland Village. However, both contain a potential restraint to HGV trafficking, with a tight bend off Station Road through Carlton, and the underpass of the A645 through Newland having an unspecified height restriction.
- 2.9.41 Therefore, to avoid these constraints, as well as the villages of Drax and Carlton, the preferred access is to be taken off private gated access points either side of the A645.

A161 to the River Trent

- 2.9.42 Access to the construction working width between the A161 and Trent River is notably poor, with access towards the River Trent being available only via narrow roads, not well suited for HGV vehicle traffic, passing through the nearby villages of Garthorpe to the south, or alternatively via Swinefleet, Whitgift, Ousefleet and Adlingfleet to the north.
- 2.9.43 To improve construction access to this area and minimise HGV movements on public roads through these villages, the Eastoft temporary construction compound has been provided to allow for the laydown of materials to be prioritised along the construction working width towards the River Trent.

- 2.9.44 For a minority of HGV movements, including potentially the working area for the River Trent HDD crossing, access via the public roads may be required. For this purpose, access via Shore Road (via Garthorpe) is considered best suited and is retained as an option.

River Humber Crossing (South)

- 2.9.45 Access to the southern side of the River Humber crossing is a key notable location due to the potentially high volume of HGV traffic and the limited existing road network in the area. Engagement is ongoing with relevant stakeholders regarding the approach to construction traffic routes, and the currently proposed approach is described below.
- 2.9.46 The Project is considering two construction methods for the River Humber crossing – a Tunnel Boring Machine (TBM) and HDD, which have different durations, construction traffic volumes and vehicle type requirements. The TBM and HDD construction methods are described later in this section.
- 2.9.47 Should a TBM method be used to install the pipeline below the River Humber, the proposed construction traffic would be routed using a one-way system loop via Thorngumbald Road / Ferry Road west of Goxhill, then East Marsh Lane and return back to College Road via Chapel Field Road and Soff Lane. Passing places would be created at appropriate places and a temporary road would be installed to allow construction traffic to bypass South End. This would be restricted to be used by construction traffic only, and the land would be reinstated to its former use upon completion, unless otherwise agreed with relevant stakeholders.
- 2.9.48 Should an HDD method be used to install the pipeline below the River Humber, the proposed construction traffic would be routed utilising a one-way system via Goxhill and East Halton, routed up Thornton Road and Ferry Road, before turning on to Skitter Road, Station Road and Townside Road, before accessing College Road. The alternative construction route would utilise a two-way system through Goxhill, adding and upgrading passing points and providing suitable traffic management. An HDD construction methodology would result in fewer traffic movements, and it is therefore assumed at this stage that construction traffic using these routes would be acceptable. Third and fourth alternative construction traffic routes include the option for a one-way system through Goxhill and South End, with the least preferable alternative being a two-way system through South End. Routes within South End would utilise Chapel Field Road, with the installation of a new bypass road to the south of

South End. It is possible that should this bypass be constructed it will be left in situ for use by the community permanently.

River Humber Crossing (North)

- 2.9.49 Access for construction traffic to the northern side of the River Humber crossing is also constrained due to the limited existing road network. From previous engagement with stakeholders, it is understood that Dark Lane, close to Thorngumbald is in poor condition with a known sensitivity to HGV traffic.
- 2.9.50 It is proposed that all construction traffic would travel between the A1033 and the construction working area for the northern side of the River Humber crossing via a private track which currently services the Rose Hill Farm and an existing National Grid Gas Pipeline AGI. The road would be used as a two-way route for construction traffic, removing any construction traffic through Thorngumbald village. While this option is preferred, further engagement is necessary to determine the current condition of the track and any requirements for improvements or localised widening to accommodate construction traffic. It is understood that this track should be suitable with minor construction works required as it was previously used for construction traffic as part of the similar River Humber Gas Pipeline Replacement Project.

Thorngumbald AGI to Winestead Temporary Construction Compound

- 2.9.51 Access between the Thorngumbald AGI and the Winestead Temporary Construction Compound is challenging for construction access as over reliance on the A1033 may cause traffic issues for the multiple towns / villages (Thorngumbald, Keyingham and Ottringham), with the majority of access points to the construction working width from the A1033 being single lane tracks of varying condition.
- 2.9.52 It is therefore proposed that the routing construction traffic along the construction working width is prioritised, either as a one-way system from the Thorngumbald AGI (accessed via Rose Hill Farm) to the Winestead TCC, or alternatively two way from the AGI and TCC separately in order to reduce the length of trafficking along the construction working width.
- 2.9.53 As this section of construction working width would involve crossing several environmentally sensitive features such as Keyingham Drain and the Winestead Drain (which is a Main River). Should crossing of these constraints prove unfeasible due to the potential impacts, alternate access points off the A1033 have been identified which would allow for some reduction in traffic movements

through the local villages, as well as to ensure that no section of the pipeline route is locked out. These minor tracks may require potential upgrade works.

A1033 – Easington

- 2.9.54 Between the A1033 crossing and Easington Pump Facility few access points well suited for two-way HGV movements are available, with public roads off the B1445 consisting typically of narrow single lane tracks.
- 2.9.55 It is proposed that construction traffic HGV movements prioritise the use of the construction working width between the A1033 and Easington Pump Facility as far as practicable, with minor tracks off the B1445 available for LGV access and a minority of HGV movements where necessary.
- 2.9.56 Use of the Holmpton Road is proposed as the HGV access to support construction of the Patrington AGI.

Abnormal Loads

- 2.9.57 The construction phase would require some equipment and machinery to be delivered via Abnormal Indivisible Loads (AILs). The AIL components requiring delivery to the Project construction area include the TBM to be used for construction of the River Humber crossing, and CO₂ pumps to be delivered to the Easington Pump Facility.
- 2.9.58 The proposed public roads to be used for the AIL access routes are shown in Volume 3 - Figure 2.1: Key Features of the Project and noted below:
- Rosper Road
 - A160
 - A180
 - Humber Road
 - Haven Road
 - A15 (Humber Bridge)
 - A63
 - A1033
 - Paull Road
 - Rose Hill Farm Private Road
 - Thorngumbald Road / Dark Lane
 - B1206 / Wold Road
 - College Road
 - Thornton Road
 - Ferry Road

- East Marsh Road

- 2.9.59 The timing of AIL movements would be discussed and agreed with the respective Local Planning Authority Highways Officers and National Highways, as required.
- 2.9.60 Some construction plant may also be categorised as AIL, depending upon the specification chosen by the contractor/s. Multiple pieces of construction plant are anticipated to fall under the designation of AIL, largely due to a width of over 2.9m, or weight over 44 tonnes. Movement of such plant would prioritise using the construction working width and would only use public highways when necessary, i.e. to overcome a lock-out point.

Traffic Management

Vehicle Routeing

- 2.9.61 An Outline Construction Traffic Management Plan (OCTMP) will be developed in support of the DCO Application. This will detail the proposed construction traffic routes.
- 2.9.62 The main works construction contractor/s would be required to develop the full Construction Traffic Management Plan (CTMP). As part of the CTMP all contractors would be required to comply with the agreed routeing plans and would ensure that all drivers are informed of the need to restrict HGV movements to those specified routes.

Localised Restrictions

- 2.9.63 Where it is possible for two HGVs associated with Project construction to meet on a section of highway that is of insufficient width to allow the HGVs to pass without reversing or overrunning the edge of the highway, movements of HGVs to and from construction sites would be controlled to ensure that such conflicts between HGVs associated with the construction works do not arise.

Management of HGV Movements

- 2.9.64 The size of loads carried by HGVs would be maximised, where practicable.
- 2.9.65 The use of HGV movements would be maximised, such as by using vehicles which have delivered material to remove waste materials, where practicable.
- 2.9.66 Where practical, the delivery of materials along the construction haul road will be prioritised in order to minimise traffic impact on identified sensitive receptors.

- 2.9.67 All HGVs transporting fine and loose material would be sheeted to avoid dust and the spillage of materials onto the highway. Dampening of surfaces, such as the haul road in locations where it is close to the public highway, would be undertaken in dry weather where the movement of vehicles it is considered that there is a risk of dust impacts.
- 2.9.68 Where there is a risk of mud from the construction works being transported onto the highway network by construction vehicles, wheel wash facilities would be provided. In order to minimise environmental impact and to reduce the need for water, a dry wheel 'wash' facility (rumble grids) would be used, where practical. If required (and safe to operate) road cleaners would be deployed if the risk of mud track out is considered significant.
- 2.9.69 Appropriate signage would be provided on the approach to construction site accesses to warn of turning and / or slow-moving vehicles.

Management of LGV / Car Movements

- 2.9.70 The oCTMP will also include measures to manage LGV and car movements and will require the contractor/s to consider sustainable modes, where practicable.
- 2.9.71 Measures which may be included are:
- The control of parking on and around construction sites to avoid inappropriate parking on verges or unsuitable highways and to deter construction workers from driving to site unnecessarily.
 - Measures to increase vehicle occupancy such as the provision of minibuses to allow construction workers to access sites without the need to arrive by personal vehicles.
 - The provision of public transport information to assist construction workers access to sites or travel by bus or train to locations where they could be picked up by minibus.
 - Provision of welfare facilities at or near to work sites to reduce the need for construction workers to travel elsewhere in the course of the day.
 - The proposed core working hours avoids construction workers travelling in the peak hours and thus reduces impacts on the local road network during network peak hours.

Watercourse Crossings for Construction Access

- 2.9.72 To facilitate construction vehicle, machine and / or personnel access to the working areas, there would be a need to cross watercourses. For example, in

instances where there is a watercourse between the construction access point (described above) and the construction working width (described below). However, using existing forms of crossing (i.e. existing culverted crossings or bridges) would be prioritised, wherever practicable.

- 2.9.73 The method for enabling temporary construction access across ordinary watercourses (also known as minor watercourses) and field drains would be dependent upon factors such as the width, depth and environmental sensitivity of the watercourse, surrounding topography, ground conditions and the type and volume of vehicles and equipment that require access across. The methods considered for managing the watercourse flow are:
- **Flume** - For dry open-cut watercourses and ditch crossings a suitably sized (to allow uninterrupted flow of water within the watercourse once installed) flume pipe would be installed over the point of the proposed crossing ensuring that it extends on each side of the trench line crossing point for a suitable distance. The flume pipe would then be bedded and packed or surrounded with soil-filled sandbags to create a dam across the watercourse, so that the flume pipes take all the flow.
 - **Over pumping** - An alternative methodology is over-pumping. The watercourse would be dammed with soil-filled sandbags and pumps would be placed up-stream of the dam. The discharge location for the hoses would be downstream of the crossing point. The discharge hose(s) would be directed through a filtering medium to limit silt carry over or bed disturbance, before the pumped water is returned to the watercourse. Pumps would be sized based on the flow rate of the water course and would be fully banded.
- 2.9.74 In both cases, the sides of the excavations would be stepped or shored up to prevent sidewall collapse. Any shoring would be assembled at ground level at a safe distance from the excavation and then lifted into position.
- 2.9.75 The method of access over the watercourse / drain would typically be via flume / culvert, overlaid with compacted aggregate allowing the running track to be formed over the pipe that is conveying any water flow. Where this is not suitable a temporary bailey bridge or similar may be used to provide access across the watercourse.
- 2.9.76 During reinstatement, watercourse banks would be reformed to their original profile with the excavated material, with flume pipe and any surplus material removed from site.

- 2.9.77 All Main Rivers would be crossed by trenchless crossing construction methods (discussed below) and construction vehicles would use existing forms of crossing access (i.e. roads) to cross from one side to another or bailey bridge (or similar).

Temporary Diversions

Roads

- 2.9.78 There are no temporary diversion of roads anticipated. As the design progresses this will be reviewed and will be assessed. Consultation with the appropriate Local Highways Authority will be undertaken if any diversions are identified.

Public Rights of Way

- 2.9.79 There may be a need for temporary diversions of Public Rights of Way (PRoW) within the draft Order Limits. As the design progresses, the requirement for the diversion of the PRoWs will be assessed for impact, factoring in the local environment, geometry, landowner consents, and frequency of users. An overarching philosophy will be applied to any potential diversions in order to minimise disruption to PRoW users:
- **Safety First:** Ensure the safety of all users by implementing clear signage, barriers, information boards, and safe crossing procedures.
 - **Minimise Disruption:** Aim to keep footpaths and PRoWs open whenever possible, using diversions only when necessary for above-ground intrusive open-cut works.
 - **Clear Communication:** Provide advance notice to the public about any planned diversions or closures, including expected durations and alternative routes.
 - **Accessibility:** Ensure that diversions are appropriately accessible to users.
 - **Regular Inspections:** Conduct regular inspections of the diversion routes to ensure they remain safe and accessible throughout the construction phase.
 - **Environmental Considerations:** Take into account the environmental impact of diversions and aim to minimise disruption to local wildlife and habitats.
- 2.9.80 Diversions would occur in the short, medium and long term. Short term closures may be required for a week and may be repeated on an occasional basis. Medium term closures would require a diversion, closure or crossing management for multiple weeks, and long-term closures may require a

diversion, closure or crossing management for multiple months, or until sectional completion of intrusive works. The length of any temporary closure would be a factor in the appropriateness of providing a diversionary route.

Methods for Constructing the Pipeline

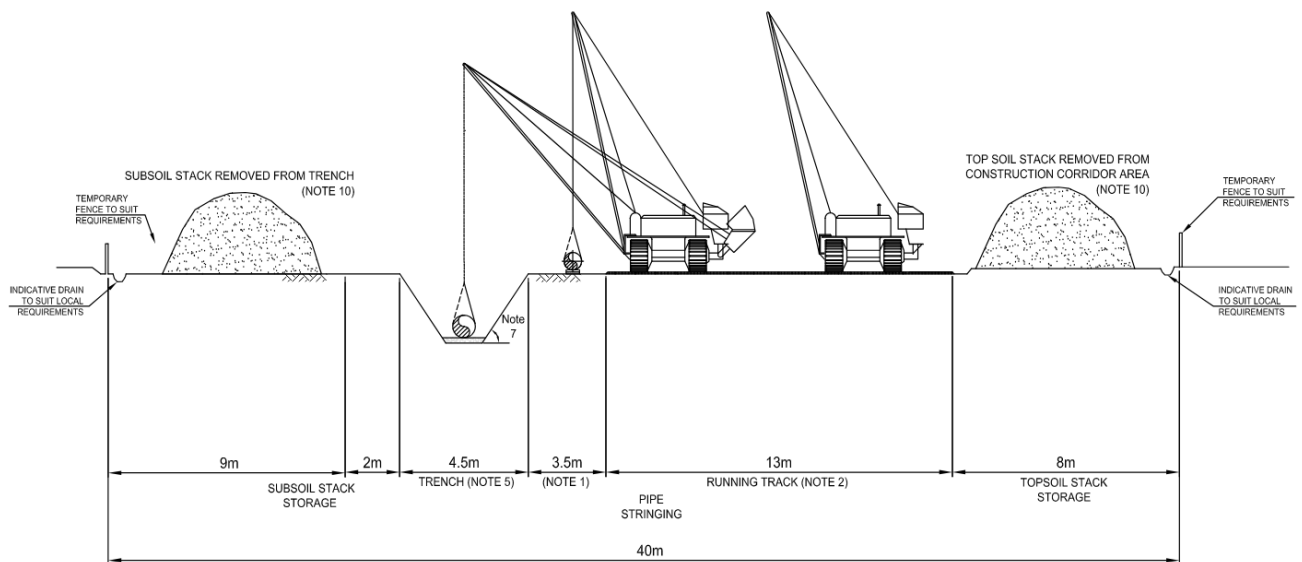
Overview

- 2.9.81 Construction of the pipeline would involve various methods and a sequence of activities that are typical for the pipeline industry and are used for the construction of other onshore, cross-country pipelines, such as natural gas.
- 2.9.82 The pipeline would be buried. The minimum depth from the top of the pipe to the ground surface (i.e., pipeline cover) would be a minimum of 1.2m. This may be deeper in some areas. Additional cover may be required to avoid existing buried utilities, to provide additional separation from surface-level features (watercourses, roads, tracks, etc.) or where trenchless construction techniques are used (discussed further below).
- 2.9.83 The sequence of activities and the various construction methods that are anticipated to be used are further discussed below.

Preparation of the Construction Working Width

- 2.9.84 All pipeline construction activity would be undertaken within a demarcated strip of land, known as the construction working width. This area would allow the construction contractor to undertake the pipeline construction activities and transport equipment and materials along the pipeline route to facilitate the installation of the pipeline.
- 2.9.85 To establish the construction working width, the area would be cleared of items which may obstruct construction works, such as fences, vegetation and topsoil. Where possible, established trees and hedgerows would be avoided. The width of topsoil to be stripped would generally correspond to the areas that will be most affected by construction activity (e.g., pipe trench, pipe string fabrication area, the temporary running track and subsoil storage stacking area). Topsoil would be stripped and stored carefully to one side of the working width in such a way that it is not mixed with subsoil or trafficked over by vehicles or construction plant (further information is discussed in Chapter 5 – Agriculture and Soils) in accordance with a Soil Management Plan (to be agreed).

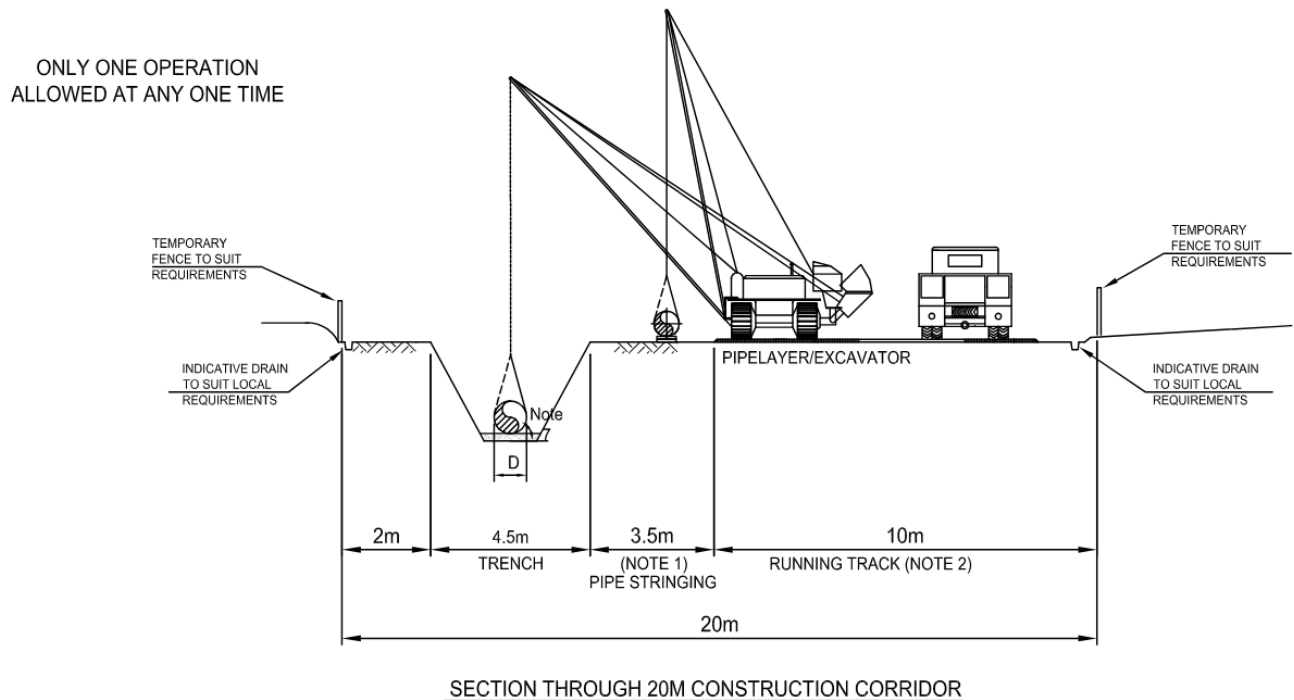
- 2.9.86 Where required, pre-construction land drainage would be installed to pick up any drains in agricultural land which will need diverting and collecting the water to avoid it flowing into the construction working width.
- 2.9.87 The construction working width would be a maximum of 40m. This would be the typical width for areas where construction works are unconstrained. An illustration of the typical arrangements for a 40m construction working width is provided in Insert 2-5 below:



Insert 2-5 – Illustrative Diagram of a 40 m Construction Working Width

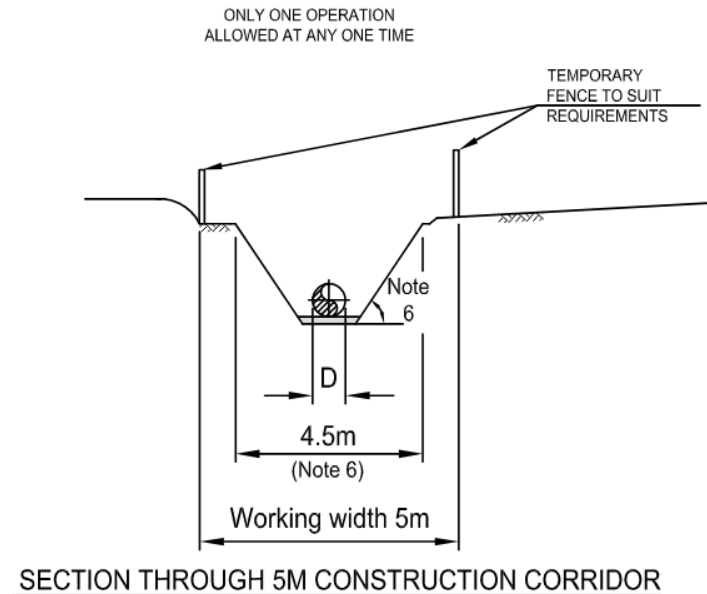
- 2.9.88 As can be seen above the topsoil and subsoil would be kept on separate sides of the construction working width to avoid contamination of soil types. Geotextiles may be used on the surface prior to storing topsoil and to separate different parts of the topsoil such as seed bed, if required. Stockproof fencing would be installed along the construction working width, to prevent animals from entering the working area. Gates may be installed, where appropriate, to allow farmers to move animals across the construction working width, where safe to do so.
- 2.9.89 Between Salt End and Easington, the construction working width may be wider than assumed for the majority of the pipeline. The installation of the power cable will require similar construction width to the pipeline and may be subject to its own minimum separation distance. Until the distance can be confirmed, a 90m construction swathe is assumed for Section 3, although it is not expected that the cable and pipeline will be installed concurrently.
- 2.9.90 Where pipeline construction works are required in sensitive areas that cannot be avoided, such as in proximity to key environmental features (e.g. sensitive

habitats or crossing of sensitive watercourses) or are constrained due to other factors (e.g. engineering or land use factors) a reduced 20m construction working width would be used. This would reduce the potential impacts of the construction works in this locality. This arrangement introduces complexities to construction logistics and programme, such as restricting the ability of construction plant and equipment to efficiently move along the working area parallel to the pipeline trench and will therefore only be used where there is a constraining factor. An illustration of the typical arrangements of a 20m construction working width is provided in Insert 2-6 below:



Insert 2-6 – Illustrative example of a 20 m Construction Working Width

- 2.9.91 For locations where construction works are required in a significantly constrained location, a 5m construction working width may be used to minimise potential impacts. This arrangement would only be used for very short sections of pipeline installation works in exceptional circumstances (e.g., significant unavoidable environmental, land use or engineering constraints) as, similar to the 20m construction working width, it would cause complications to construction logistics. An illustration of the typical arrangement for a 5m construction working width is provided in Insert 2-7 below:



Insert 2-7 – Illustrative example of a 5 m Construction Working Width

Open-cut pipeline installation method

- 2.9.92 Due to the majority of the land within the draft Order Limits being situated in a predominantly flat, open agricultural setting, the majority of the pipeline would be constructed using 'open-cut trench' method.
- 2.9.93 Open-cut method would be used for agricultural land, buried service crossings, minor roads / tracks, minor and / or non-sensitive watercourses.
- 2.9.94 The open-cut pipeline installation method would typically work in 'stretches' i.e. sections of open-cut works at a time. The extent and duration of the works associated with each stretch would be heavily influenced by aspects such as topography, ground conditions and any environmental or lands constraints.
- 2.9.95 In typical circumstances, open-cut sections would be worked on in stretches of 40 – 50m, but potentially up to 1km, at a time. The duration of the works for each open-cut stretch would be up to approximately 2 months at a time.
- 2.9.96 The open-cut pipeline installation method would involve the following steps:

Pipeline Stringing, Bending and Welding

- 2.9.97 Lengths of pipe (typically around 12-18 m long) would be delivered to the construction working width from the temporary construction compounds, unloaded and located along the pipeline route (referred to as 'stringing'). The centreline of the pipeline trench would be established and demarcated.

- 2.9.98 Sections of pipe may then be bent on site using a cold bending machine to accommodate horizontal and vertical changes in the required direction of the pipeline and / or to follow the profile of the ground.
- 2.9.99 The ends of the pipe are prepared, inspected, aligned and then clamped in place for welding using a suitable welding technique.

Non-destructive Examination and Non-destructive Testing

- 2.9.100 After the welding is completed, the pipeline joint is thoroughly cleaned by mechanical wire brushing, visually inspected for defects via a non-destructive examination (NDE) method and then X-rayed to check on weld integrity via a NDT method.
- 2.9.101 After the welds have been inspected for defects / faults there may be requirements for weld repairs. These may be accepted for repair, or if unacceptable, will be required to be cut out and a complete joint re-weld and the NDE and NDT tests repeated.

Joint Coating

- 2.9.102 Once the pipeline joints have successfully been inspected, a coating shall be applied to cover each joint. A typical coating for this purpose would be 100% solids epoxy.
- 2.9.103 Each joint would be thoroughly cleaned by mechanical wire brushing and / or sand blasting to achieve a smooth grease-free surface.
- 2.9.104 Once the coating is applied, it would be inspected to ensure that there are no defects or 'pin holes' in the coating.

Trench Excavation

- 2.9.105 The trenches within which the pipeline would be installed would be excavated either via trenching machines or mechanical excavators (referred to as 'open cut' excavation).
- 2.9.106 The excavated depth would be variable but would normally result in a minimum reinstated pipeline cover of 1.2m (measured from the top of the pipe to ground level). Excavated depths may be deeper and can be influenced by multiple factors, such as topography or the requirement of the pipeline to cross an existing buried asset or surface feature.

- 2.9.107 Dewatering of the pipeline trenches may be required in some areas to stabilise the ground during construction.

Open-cut Crossings

- 2.9.108 Some crossings of minor watercourses, B-roads and minor roads / tracks would involve open-cut trenching.
- 2.9.109 The open-cut method may be used where the pipeline is required to cross minor watercourses such as natural streams, irrigation channels and land drains. This method would generally involve establishing a temporary working area for the crossing, typically within the confines of the agreed pipeline construction corridor boundary, the excavation of a trench through the watercourse, installation of the pipeline along the bottom of the trench, backfilling of the trench, and reinstatement of the watercourse bed and banks to original condition. The crossing pipeline section would then be connected to the adjoining sections of the pipeline on each side of the watercourse.
- 2.9.110 Prior to crossing construction, site-specific surveys would be performed to determine the most appropriate location for the crossing and the location and extent of the temporary crossing construction area. The crossing points would be located where disturbance to the watercourse banks and bed, and any sensitive natural features present, can be minimised as far as practicable.
- 2.9.111 The temporary construction area would be necessary to provide a stable working platform for watercourse crossing construction and pipeline installation operations. The establishment of a temporary construction area generally involves the installation of temporary site access track, removal and storage of topsoil for later reuse, installation of temporary hardstanding areas for construction equipment and personnel, and installation of temporary site fencing. After the temporary construction area has been established, construction equipment and materials would then be mobilised to the site to commence crossing construction activities.
- 2.9.112 Watercourse crossings are typically planned for dry or low-flow conditions in the watercourse. In dry conditions, a trench can be excavated across the watercourse, the crossing pipeline section installed, the trench backfilled, and the watercourse bed and banks reinstated to original condition. In low-flow conditions, the flow would be diverted around the works area to a suitable point downstream of the crossing via temporary pipework installed so that water in the channel can continue to flow. The crossing can then be installed in dry conditions.

- 2.9.113 For watercourses where construction of the crossing at times of increased flow cannot be avoided, the crossing can be installed in wet conditions. This method involves excavation of the trench under water using equipment on the banks of the watercourse. The pipeline is then lowered into the trench, and the trench backfilled, leaving the ends of the pipeline on either side of the crossing accessible for connection to the adjacent pipeline sections on each side of the crossing. At locations where construction equipment is required to work within the watercourse channel, temporary flume pipes are typically installed to allow flow in the channel to continue. Hardstanding materials are typically installed over the flume pipes to provide a stable and safe working platform for construction equipment. Crossing construction can then continue with minimal disturbance to the watercourse bed and banks outside of the trench extents. Additional measures to minimise the effect of crossing construction activities on the quality of the water flowing through the crossing location during construction, such as turbidity filter screens and specialist construction equipment, would be considered on a case-by-case basis and implemented as appropriate.
- 2.9.114 All construction equipment, waste materials, and site hardstanding materials would be removed from the sites after crossing construction. Previously stored topsoil would be spread back over the affected areas and the site areas reinstated in accordance with landowner requirements and Project commitments. Watercourse beds and banks would be reinstated to original condition, or better.
- 2.9.115 For open-cut crossings of roads and / or tracks, traffic would be managed either via temporary road closure (typically for up to 48 hours) with traffic diversions put in place and signposted or via traffic management systems to implement a contraflow (or other similar traffic controlling measures). In some instances where a temporary traffic diversion is not practical, a temporary bypass may be constructed using either stone or asphalt surfacing, depending on the volume of traffic anticipated, with temporary speed restrictions put in place, as appropriate. Reinstatement of highways would be in accordance with Department for Transport requirements Specification for the Reinstatement of Openings in Highways. For cases where construction activity would be ongoing and may affect the safety of traffic passing by, marshals shall be involved to control the movement of vehicles.
- 2.9.116 For open-cut crossings, a reduced construction working width (as described above) may be implemented if deemed appropriate and works would be timed to avoid, as far as practicable, respective sensitive times / seasons.

- 2.9.117 Crossing of major features such as main rivers, trunk roads and railways are discussed in the 'Trenchless Crossing' section below.

Bedding and Pipe Lowering

- 2.9.118 Once the welding and joint coating have been completed and the trench has been excavated, the sections of pipe would be lowered into the trench. This would typically be undertaken by machines known as 'side-booms' or similar equipment. This process would continue along the construction right of way, with each step in the process following on from one another.
- 2.9.119 In instances where the base of the excavated pipeline trench is in areas of hard ground or rock, 'bedding and padding' the trench may be required.
- 2.9.120 This would involve processing the excavated material via a mobile screening machine to remove sharp objects which may damage the pipe. The output of the screening process would be material suitable for placing in the base of the trench for the pipeline to be placed on. Similarly, material would be placed around and on top of the pipeline.

Pipeline Tie-ins

- 2.9.121 Once the sections of pipe are lowered into the trench, each section would then be welded (referred to as tie-ins) to the adjacent section to form the continuous pipeline.
- 2.9.122 Localised excavation of the trench, lift of the pipe sections and support by skids in the trench may be required to allow the full circumference of the pipe sections to be accessible for welding.
- 2.9.123 Once the tie-ins are welded, they would be coated and inspected following a similar process as described above.

Backfill

- 2.9.124 The pipeline trenches would then be backfilled, where possible with the material taken from the trenches in the reverse order in which it was excavated preserving the original soil sequence.
- 2.9.125 Where excavated material is not suitable to be placed in direct contact with pipe (i.e., immediately surrounding the pipe) The backfilled material would be screened, prior to placement, to ensure it is suitable for use as backfill and would not damage the pipe or the pipeline coating. In certain situations, where backfill

material is particularly unsuitable (e.g., high rock content), imported backfill would be used.

- 2.9.126 The backfill materials would be consolidated in layers by tamping or rolling to ensure consolidation comparable with the adjacent subsoil. Any excess material may be spread within the working width.
- 2.9.127 Where necessary, outfall drains would be re-connected across the trench as part of the backfill operation. The pipe trenches would be left open for the minimum length of time as is practicable. Where necessary, additional post-construction drainage would be installed within the construction working width to ensure that the integrity of the drainage infrastructure affected by construction is adequately restored.
- 2.9.128 Detailed drainage designs would have regard to soil type, existing drainage systems and land levels.

Trenchless Crossing Installation Method

- 2.9.129 Where the pipeline is required to cross complex and / or sensitive existing features, such as major roads, railways, main rivers and environmentally sensitive areas, a 'trenchless' construction method would be used. The techniques for crossing the River Humber are discussed at 2.9.169.
- 2.9.130 There are multiple different types of trenchless construction techniques. However, all technique types would involve installing the pipeline below an existing feature, without excavating or disturbing the ground surface, as with the open-cut method.
- 2.9.131 The depths of the trenchless crossings would vary and be dependent on the characteristics of the feature to be crossed (i.e. the channel depth of a main river), ground conditions, trenchless crossing method and any spatial restrictions, amongst other reasons. The final depth of cover would be confirmed during detailed design and would ensure overall safety and integrity of the pipeline as well as the feature to be crossed.
- 2.9.132 Upon completion of the trenchless crossing works, all land used for temporary working areas and pits would be restored, regardless of the technique used.
- 2.9.133 The following types of trenchless construction methods may be used, which are discussed in further detail below:
- Auger bore.
 - Microtunnel.

- Direct pipe.
- HDD.

Auger Bore

- 2.9.134 Auger boring is a common method for short trenchless crossings on pipeline projects.
- 2.9.135 This technique involves excavating a ‘pit’ at either side of the crossing, which may be supported by sheet piles or other forms of excavation stabilisation.
- 2.9.136 An auger would be placed in one pit (launch pit) and used to bore horizontally beneath the feature to be crossed and end at the other pit (reception pit). Sections of pipe would then be pushed through from the launch pit to the reception pit using equipment that would thrust against the reception pit wall. Alternatively, pipe sections would be simultaneously pushed as the auger advances along the crossing length. The pit sizes are typically 10m width by 20m length to accommodate the equipment and welding area. Dewatering may be required if the crossing level is below the ground water level.
- 2.9.137 A variation of this method is ‘guided auger bore’, which follows the same broad principles as auger boring but involves guidance systems to more accurately control grade and alignment. Therefore, guided auger bore is more suitable for crossings where stricter controls on the crossing alignment are required.
- 2.9.138 This installation method is suitable for crossings typically between 20m – 100m.
- 2.9.139 The duration of works associated with an auger bore crossing would be dictated by aspects such as the length of the crossing, ground conditions and any local constraints. However, a typical auger bore crossing would take approximately six weeks from mobilisation through to reinstatement of the site.
- 2.9.140 The advantages and disadvantages of this trenchless installation method are summarised in Table 2-7 below:

Table 2-7 – Advantages and Disadvantages of Auger Bore Trenchless Crossing Method

Advantages	Disadvantages
Relatively low cost	Can only be used for relatively short crossings (up to 100m in length)

Advantages	Disadvantages
Small working area	Generally, not suitable for the same range of ground conditions as other methods

- 2.9.141 An illustrative example of an auger bore crossing is provided in Insert 2-8 below:



Insert 2-8 – Illustrative example of an Auger Bore Crossing

Microtunnel

- 2.9.142 Microtunnelling is a common method for both short and long trenchless crossings, particularly where ground conditions may not be suitable for auger bore or HDD methods.
- 2.9.143 The method involves establishing drive and reception pits, or shafts, on either side of the crossing which may be supported by sheet piles or other forms of excavation stabilisation and then jacking precast concrete pipes into the ground behind a tunnel boring machine from the drive shaft to the reception shaft. The precast concrete jacking pipes would remain in situ below ground following completion of the crossing works.
- 2.9.144 Excavation typically takes place by rotating a cutting head at the front of the tunnel boring machine but can involve use of operator-controlled excavation equipment at the tunnel face. Excavated spoil is transported back to the surface at the drive shaft site.
- 2.9.145 The pipeline crossing section to be installed inside the completed tunnel can be prefabricated into a single pipe string, the same length as the tunnel, for a single continuous installation (push or pull) operation if the configuration of the

reception pit or shaft allows. Alternatively, the pipeline can be installed inside the completed tunnel in multiple shorter sections which are welded together and pulled or pushed into the tunnel from the drive or reception pit / shaft.

- 2.9.146 The working area for the drive shaft would be range from approximately 2,000m² to 10,000m² and the reception pit between approximately 1,000m² and 4,000m². The area required would be dependent upon factors such as the length of the crossing, the presence of local constraints and ground conditions.
- 2.9.147 The microtunnel method is typically used for crossings of 50m – 1,000m and suitable for all ground conditions.
- 2.9.148 The duration of works associated with a microtunnel crossing would be dictated by aspects such as the length of the crossing, ground conditions and any local constraints. However, a typical auger bore crossing would take approximately 13 weeks from mobilisation through to reinstatement of the site.
- 2.9.149 The advantages and disadvantages of this trenchless installation method are summarised in Table 2-8 below:

Table 2-8 – Advantages and Disadvantages of Microtunnel Crossing Method

Advantages	Disadvantages
Long crossing lengths possible (greater than 1,000m)	Highest cost compared to other methods
Can be used in greater range of conditions than horizontal directional drill	Tunnel diameter generally increases as the length of the crossing increases
Preferred method for most regulating authorities	May require workers to operate in confined spaces – increasing health and safety risks

- 2.9.150 An illustrative example of a microtunnel crossing is provided in Insert 2-9 below:



Insert 2-9 – Illustrative example of a Microtunnel Crossing

Direct Pipe

- 2.9.151 Direct Pipe is another method for construction of trenchless crossings on pipeline projects, where ground conditions may not be suitable for HDD or auger bore. Direct pipe can offer an advantage over HDD regarding ground settlement risk.
- 2.9.152 The method, working area requirements, accuracy, and applicable ground conditions are generally similar to microtunnelling (a tunnel boring machine is driven from one side of the crossing to the other).
- 2.9.153 The pipeline would be installed directly into the ground behind the tunnel boring machine. This method may require installing an initial diameter steel casing pipe with a larger diameter than the pipeline via the direct pipe method, with the pipeline subsequently being installed inside the steel casing pipe.
- 2.9.154 The direct pipe method is typically suitable for crossing lengths up to 1000m.
- 2.9.155 The duration of works associated with a direct pipe crossing would be dictated by aspects such as the length of the crossing, ground conditions and any local constraints. However, a direct pipe crossing would take approximately 2 to 8 weeks from mobilisation through to reinstatement of the site.
- 2.9.156 The advantages and disadvantages of this trenchless installation method are summarised in Table 2-9 below:

Table 2-9 – Advantages and Disadvantages of Direct Pipe Crossing Method

Advantages	Disadvantages
Lower cost than microtunnelling over a similar length	Highest cost compared to other methods
Long crossing lengths possible (greater than 1,000m)	Longer crossings may require large diameter casing pipe installation for subsequent installation of small diameter pipeline
Can be used in greater range of ground conditions than horizontal directional drill	
Lower settlement risk than horizontal directional drill	

2.9.157 An illustrative example of a direct pipe crossing is provided in Insert 2-10 below:



Insert 2-10 – Illustrative example of a Direct Pipe Crossing

Horizontal Directional Drill

2.9.158 Sites for HDD equipment are established at either side of the obstacle to be crossed. A series of flexible rods would be driven through the earth from a launch pit to form a small 'pilot' hole. As the rods progress through the earth, extra rods would be added until the drill head emerges at a reception pit. At the reception pit, the drill head would be removed, a larger one attached and it is pulled back. This would continue to enlarge the hole until it is a size greater than the pipe to be installed.

- 2.9.159 Drilling fluid, such as bentonite, is utilised to stabilise the drilled hole during all stages of the drilling operation. The pipeline section to be installed in the drilled hole is typically prefabricated into a single 'string' the same length as the crossing to enable a single continuous installation operation. The welded pipe would then be pulled back through the hole completing the drilling operation.
- 2.9.160 With the pipelines successfully pulled through the crossing, the ends would be connected to the rest of the pipeline, and the area would be re-instated to its original condition.
- 2.9.161 The working area required for HDD crossings is typically between 1,000m² to 5,000m², depending on the length of crossing, local terrain and other constraints.
- 2.9.162 Typical crossing length for HDD are between 200m and 2,000m. This method is generally considered unsuitable for soils containing high gravel or boulder content or in highly fractured rock.
- 2.9.163 The duration of works associated with a HDD crossing (excluding the River Humber crossing, which is discussed further below) would be dictated by aspects such as the length of the crossing, ground conditions and any local constraints. However, a typical auger bore crossing would take approximately 12 weeks from mobilisation through to reinstatement of the site.
- 2.9.164 The advantages and disadvantages of HDD method are summarised in Table 2-10 below:

Table 2-10 – Advantages and Disadvantages of HDD Method

Advantages	Disadvantages
Long crossing lengths possible (greater than 1,000m)	Requires a long pipe fabrication and stringing area
Generally lower cost than microtunnelling or direct pipe over the same length	Not suitable for the same range of ground conditions as microtunnelling or direct pipe
The drilling operation commences from the surface, eliminating the need for deep pits	Due to the curved vertical alignment required of the installation method, HDD is not suitable for short crossings
Less temporary / permanent works required than microtunnelling or direct pipe	

Proposed List of Trenchless Crossings

- 2.9.165 A preliminary schedule of where a trenchless crossing is proposed is provided in Table 2-11 below and the locations are indicated on Volume 3 – Figure 2.1: Key Features of the Project.
- 2.9.166 The use of trenchless methods at any additional locations will be informed by further engineering studies, the findings of environmental surveys and assessments and engagement with stakeholders.
- 2.9.167 The proposed list of trenchless crossings will be presented in the ES.

Table 2-11 – Preliminary Schedule of Trenchless Crossings

Trenchless crossing no.	Route Section	Type of feature crossed	Name of feature crossed
1	1	Watercourse	River Ouse*
2		Watercourse	River Ouse*
3		Road	A645
4		Watercourse	River Aire
5		Railway	Wakefield and Goole Line
6		Road	A614
7		Road	M62
8		Road	M62
9		Watercourse	Aire and Calder Navigation
10		Watercourse	Dutch River
11		Road	M18
12		Railway	Sheffield to Hull Line
13		Road	A161
14		Watercourse	River Trent
15	2	Watercourse	Halton Drain
16		Road	A1077
17		Watercourse	New River Ancholme

Trenchless crossing no.	Route Section	Type of feature crossed	Name of feature crossed
18		Road	A15
19		Road	A1077
20		Railway	Barton Line
21		Watercourse	East Halton Beck
22		Watercourse	East Halton Beck
23		Railway	Brocklesby and Immingham Branch
24		Watercourse	River Humber
25	3	Watercourse	Winestead Drain
26		Watercourse	Winestead Drain
27		Road	A1033 – Winestead Lane
28		Road	A1033 – Hollym Road
29		Road	A161
30		Road	A180

**Crossing accommodated in the draft Order Limits but not currently expected to be required.*

- 2.9.168 To provide flexibility for the construction contractors and to ensure that the EIA accounts for likely significant effects, it is proposed that the reasonable worst-case, limits of deviation of each of the trenchless crossing methods are considered where a trenchless crossing is proposed.

River Humber crossing

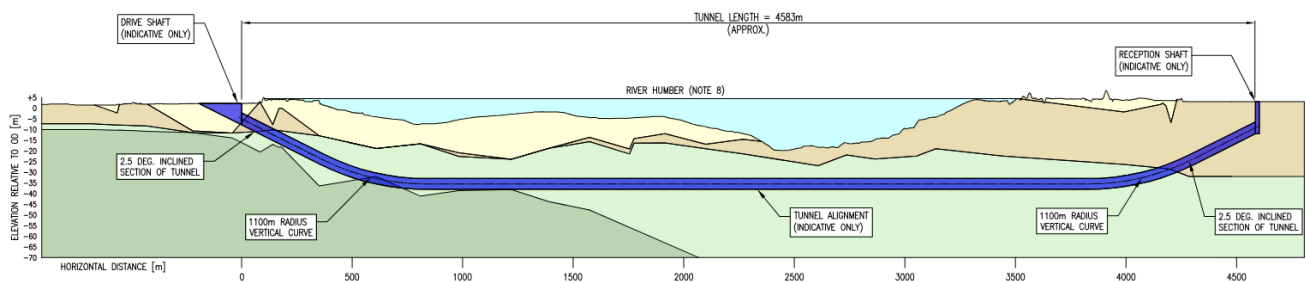
- 2.9.169 The Project route would require crossing the River Humber. The proposed crossing area (shown on Volume 3 – Figure 2.1: Key Features of the Project) involves a distance of approximately 4.5km, which presents a construction challenge.
- 2.9.170 Due to the complexity of crossing the River Humber, only the following methods of trenchless installation are considered feasible:

Tunnel Boring Machine

- 2.9.171 The method would generally involve the construction of a tunnel below the bed of the River Humber between temporary construction sites on each side of the river, with the pipeline inserted into the completed tunnel. The tunnel pipeline section would then be connected to the adjacent sections of the pipeline on each side of the river.
- 2.9.172 Prior to tunnel construction, site-specific surveys would be performed to determine the specific working areas and extent of temporary construction areas. Temporary construction areas would be established on agricultural land on each side of the river an appropriate distance away from river banks and sensitive locations.
- 2.9.173 The temporary construction sites on both sides of the river would be necessary to provide stable working platforms for tunnel construction and pipeline installation operations. The tunnel drive shaft site on the west side of the river would be a base for drive shaft construction, tunnel construction, and pipeline fabrication and installation activities. The tunnel reception shaft site on the east side of the river would be a base for reception shaft construction, and recovery of the Tunnel Boring Machine (TBM) to the surface after completion of tunnelling activities.
- 2.9.174 Establishment of temporary construction sites would involve the installation of temporary site access roads, removal and storage of topsoil for later reuse, installation of temporary hardstanding areas for construction equipment and

personnel, installation of temporary site fencing, and installation of temporary utilities to support construction activities. Provisions will be made to accommodate locally displaced run off, prioritising infiltration methods, such as trenches to encourage absorption, which will be installed with silt fencing to prevent silt impacting surrounding watercourses. Areas that are not currently connected to existing drainage systems will have drainage installed in line with SuDS principles, ensuring pre-development runoff rates are maintained.

- 2.9.175 After temporary construction sites have been established, temporary office and welfare buildings would be built, and temporary car parking and vehicle turning areas installed. Construction equipment and materials would then be mobilised to the respective sites to commence construction activities. It is not currently proposed that the welfare buildings or office will be connected to the mains supply.
- 2.9.176 At the tunnel drive shaft site, a rectangular shaft with an inclined base would be built below ground which would provide a portal structure in which the TBM can be assembled and launched into the ground. The portal structure would also provide a means of access from the surface for delivery of tunnel construction materials, equipment and personnel to the TBM during tunnel construction, as well as providing a route back to the surface for excavated material from the tunnelling operation. After completion of tunnelling operations, the drive shaft would also provide a portal into the tunnel for pipeline installation activities.
- 2.9.177 At the tunnel reception shaft site, a deeper circular shaft would be built below ground which would provide a reception structure for the TBM at the end of the tunnelling operation.
- 2.9.178 The tunnel would extend a distance of approximately 5km between the drive shaft and the reception shaft. Tunnel diameter would be an appropriate size to ensure that tunnelling can be performed safely, and sufficient space is available inside the completed tunnel for the pipeline. This is expected to be approximately 3.65 m in diameter. The tunnel alignment would be planned to pass at a safe depth below river bed level, with a minimum of 10 m depth at its shallowest point, optimised to ensure the perennial integrity of the tunnel. During tunnelling, excavated soil from tunnelling operations would be transported from the TBM, back through the tunnel, and brought to the surface for treatment before being transported from site for reuse or disposal at an agreed location. An illustration of the indicative Humber tunnel is shown in Insert 2-11.



Insert 2-11 – Indicative Humber Tunnel

- 2.9.179 After completion of tunnelling activities, the pipeline would be fabricated into a predetermined number of separate pipe strings at the tunnel drive shaft site and pushed or pulled into the tunnel. After completion of pipeline installation into the tunnel, pipeline sections would be installed in the drive and reception shafts to connect the tunnel pipeline section back to the surface.
- 2.9.180 After completion of pipeline installation activities, the tunnel would be sealed around the pipeline and the drive and reception shafts backfilled with a suitable fill material. Temporary works will be required to support construction of drive and reception areas. As far as practical these will be removed, but it is possible that some features will remain permanently in order to maintain ground stability prior to backfilling of the excavations.
- 2.9.181 All construction equipment, waste materials, temporary buildings and fencing, and site hardstanding materials would be removed from the sites. Previously stored topsoil would be spread back over the affected areas and the site areas reinstated in accordance with landowner requirements and Project commitments.

Horizontal Directional Drill

- 2.9.182 This would follow the same principles as the HDD methodology described above.
- 2.9.183 The size of the working area at either side of the crossing would be approximately 3,200m², with an additional area of approximately 2,000m² to be used as lagoons for the storage of water and arisings from the HDD operation.
- 2.9.184 Temporary construction site compounds will be provided, with construction equipment laydown areas, offices, welfare, car parking facilities, topsoil storage and fluid storage areas. A suitable hardstanding material will be underlying the offices and equipment laydown areas, but not beneath the storage. If required,

sheet piling will support the HDD rig anchorage, with suitable fencing and drainage measures installed.

- 2.9.185 The rig anchorage (driven piles or similar) and entry pit. The drilling area will contain a holding area for drilling fluid, returning from the HDD bore prior to onward processing. Drilling fluid is typically a mixture of fresh water and bentonite clay in powder form, mixed on the surface and pumped into the drill string using a high-pressure drilling fluid pump. Drilling fluid will return to the surface through the excavated HDD bore where it will be pumped from the entry pit through spoil separation and drilling fluid recycling equipment. Separated soil will be temporarily stored on site for later removal to an appropriate waste disposal facility.
- 2.9.186 The design and draft Order Limits currently consider the option of ‘stringing’ the full 4.5km extent of pipeline on either side of the River Humber. Stringing of a pipeline is constrained by limits to how far the stringing route can ‘bend’. Therefore, to allow the full extent of the string to be established, this may involve extents of the pipeline ‘string’ crossing minor roads or watercourses. Where this is the case, the string would either ‘overpass’ the feature via methods such as containers with rollers, that would allow the pipeline string to pass over the feature, or ‘underpass’ i.e. via an excavated culvert.
- 2.9.187 Depending on the hole diameter, an “intersect” method may be used to construct the HDD, where the length of the crossing is important, such as in the case of the Humber crossing. Construction of an intersect HDD starts in the same way as a standard HDD but includes pilot drilling from either side. Near the middle of the crossing, the two pilot holes are then joined in preparation for reaming of the complete hole. This method typically requires the use of two HDD rigs operated simultaneously and can allow string pulling from either side.
- 2.9.188 Both options would cross a minimum of 10m below the true bed of the river.
- 2.9.189 The feasibility of these crossing techniques for the River Humber remains ongoing. Accordingly, to provide flexibility for construction execution, both TBM and HDD construction methods are being assessed. In addition, a scenario which assumes the HDD has started and was impossible to complete, and TBM may then be deployed, is also the subject of assessment. This would be the worst-case scenario to be assessed within the EIA and reported within the ES.

Table 2-12 – Comparison of TBM and HDD Methodology for the River Humber Crossing

	TBM	HDD
Construction duration	Approximately 4 to 4.5 years.	Approximately 14 months.
Construction feasibility	Proven to work in a nearby location with similar geology under the River Humber.	An HDD intercept of the required length and diameter is at the upper limit of what is currently achievable in HDD and can therefore be considered technically challenging, even in ideal ground conditions.
Working hours	24-hour working required between 13 to 19 months, approximately.	24-hour working required between 2 to 7 months, approximately.
Inspection / maintenance / expansion	Pipeline inspection would be internal only. Pipeline replacement would be possible but challenging as tunnel will be filled. Additional service(s) could be installed through pre-installed conduit, if provided.	Pipeline inspection would be internal only. Pipeline cannot be replaced inside the bore. A new HDD bore would be required. No additional service can be installed.

Switching the River Humber Launch and Receive Approach

- 2.9.190 Construction activities for the River Humber crossing (tunnel option) are expected to generate more construction traffic at the launch site than at the reception site. One proposed solution to reduce construction traffic on public roads is to switch the locations of these sites, relocating the Tunnel Launch Shaft to the north side near Paull and the Tunnel Reception Shaft to the south side near Goxhill. The HGV movements required for the launch site are approximately 50% less than the reception site.
- 2.9.191 While this option is technically feasible, it is not preferred and should only be considered if alternative solutions are unachievable. Geotechnical data supports the original placement of the Tunnel Reception Shaft on the north side, where the till layer is thickest. Tunnelling from south to north has been successfully used in other projects.
- 2.9.192 Relocating the site compounds could introduce challenges, such as prolonged construction near residential properties and a potential reduction in pipeline length. Additionally, it may increase risks associated with the crossing construction, a complex aspect of the Project. Therefore, switching the compound locations is not recommended, and other alternatives can be pursued without additional risks.

River Humber Crossing Waste Management

- 2.9.193 The Humber crossing is a significant part of the HCCP Project as it is the longest and either of the two proposed methods of trenchless installation would generate a volume of waste.
- 2.9.194 The estimated waste quantities for each option, along with the reasonable worst-case disposal method and opportunities that will be explored as the design progresses to mitigate potential impact are set out in Table 2-13 below:

Table 2-13 – River Humber Crossing Waste Management

Crossing method	Waste stream	Waste characterisation	Estimated quantity	Disposal Method	Mitigation opportunity
Horizontal directional drill	Drilling - pipeline	Spoil / Cuttings	6,500 tonnes	Offsite	Send to land reclamation
	Drilling – fibre optic cable	Spil / cuttings	2,000 tonnes	Offsite	Send to land reclamation
	Water holding lagoon	Grey water (non – hazardous)	2,900m ³	Offsite	Check the composition / water quality, and potential to pump back into the estuary
	Removal of hard standing	Granular material	3,500m ³	Offsite	Recycle – potential for use on other nearby construction projects
	Removal of temporary access roads after construction	Granular material	7,000m ³	Recycle – potential for use on other nearby construction projects	Reuse / recycle to reduce demand for raw materials and prevents landfill use.
Tunnel boring machine	Tunnel excavation	Spoil / excavated material	150,000 tonnes	Offsite disposal / landfill / re-use in sit	Land reclamation
	Temporary drainage removal	Granular material	2,000 tonnes	Offsite disposal	Recycle – potential for use on other construction projects

Crossing method	Waste stream	Waste characterisation	Estimated quantity	Disposal Method	Mitigation opportunity
	Removal of hard standing for site compounds	Concrete and granular material	95,000 tonnes	Offsite disposal	Recycle - potential for use on other construction projects

Method of Installing the Pipeline at the Landfall

- 2.9.195 Eastwards from the Pump Facility, there would be a short section of 'open cut' pipeline installation through an agricultural field to the point at which the offshore pipeline construction works, and onshore pipeline construction works interface (the landfall area). The landfall area is the area between the Pump Facility and the extent of the draft Order Limits at the MLWS.
- 2.9.196 The seabed sediment in the area is known to be highly mobile, and the cliffs are known to be subject of active coastal regression and associated seabed lowering. The cliffs are indicated to be retreating at around 1.5 m to 3.0 m/year. The clay seabed at the beach and nearshore is lowering at a rate of between 0.03 m and 0.21 m/year (Ref 2.2). Therefore, the construction methods would ensure that the pipeline is buried below the predicted cliff line and seabed profile throughout its design life (25 years). The DCO will only seek consent for works required up to the Mean Low Water Springs. Works seaward beyond this extent, through the marine environment, are described in the NEP Offshore ES (Ref 2.2) and will be subject to a separate consent.
- 2.9.197 The pipeline would be installed beneath Dimlington Cliffs via one of the following trenchless methods.

Horizontal Directional Drill

- 2.9.198 The HDD would pass beneath the cliffs and foreshore and exit at an area approximately 8 m below the Lowest Astronomical Tide (LAT) point, beyond the MLWS limit of the Project and therefore the exit point is part of the separate application for the offshore pipeline but shall comprise part of the cumulative effects assessment within the EIA for this Project. Therefore, the works from the launch pit to the MLWS limit of the DCO would involve below ground boring.
- 2.9.199 This method includes a requirement for the top of the pipeline to be at a depth of at least 10m below the seabed in the intertidal zone at the end of the design life to protect the pipeline from seabed erosional forces and long-term seabed lowering anticipated at the end of life of the Project.

Direct Pipe

- 2.9.200 A launch pit would be created onshore, land side of the Dimlington Cliffs, and the pipe would be thrust beneath the cliffs to a reception pit where a jack-up barge would retrieve the boring machine and pipeline at approximately 4 m below LAT, beyond the MLWS limit of the DCO.

- 2.9.201 Therefore, the works from the launch pit to the MLWS limit of the DCO would involve below ground boring.

Microtunnel

- 2.9.202 The microtunnel boring machine would be launched from within a shaft at the landfall point and would pass beneath the cliffs. The exit point would be approximately at the MLWS point at a pre-cut trench that is maintained to keep it free of silt and sand accumulations.
- 2.9.203 The pipeline tunnel would be at a depth of approximately 5.7 m below the seabed to the top of casing, to ensure sufficient coverage over the pipeline design life.
- 2.9.204 After the pipeline has been installed, it would be buried using the excavated material and the beach would be reinstated to the pre-construction condition as far as reasonably practicable.

Microtunnel with Cofferdam

- 2.9.205 This method includes an option of temporarily installing a sheet pile cofferdam reception pit for the microtunnel method, which would be located on the foreshore approximately between the Mean High-Water Springs (MHWS) and MLWS, which would allow for recovery of the microtunnel machine from the foreshore. The cofferdam would be approximately 140 m x 3 m (with larger pit, working platform and walls at the end) and installed via one or more conventional pile driving rigs (hydraulic vibratory hammer mounted on a tracked crawler vehicle) as tides permit. Pre-auguring of the ground over the full pile depth may be required due to the presence of clay and would be undertaken using a continuous flight auger rig. Following the piling works, the area inside of the working platform would be built up to approximately +4 m Ordnance Datum Newlyn (ODN) by re-using sands and gravels excavated for the cofferdam.
- 2.9.206 The microtunnel with cofferdam option would involve creating a temporary access track through the cliffs, east of Dimlington Gas Terminal and north of where the existing coastal defences begin, to allow the vehicles and machinery associated with installing the cofferdam to access the intertidal area. This temporary access would be taken from Dimlington Road and involve creating a temporary access track to the cliff. Excavators would then be used to move material and create an access track through the cliff area, at a suitable width and gradient to allow the necessary vehicles to gain safe access. Geotextile and suitable capping material may be required, dependent on the gradient and the vehicles that would use the access.

- 2.9.207 The won material would be temporarily stored onshore at a suitable distance from the cliff edge for subsequent reinstatement. It is anticipated that it would take approximately six months between the start of construction and the final reinstatement for this access track. All other landfall methods described above would not require this access track to be created as the landfall works would be served from the sea and therefore would not require works in the intertidal area.

Comparison of the Four Options

- 2.9.208 Table 2-14 displays the advantages and disadvantages for each methodology.

Table 2-14 – Comparison of the Cliff Crossing Methodologies

	HDD	Direct Pipe	Microtunnel	Microtunnel with cofferdam
Impact on Cliff	Cliff not affected by construction.	Cliff not affected by construction.	Cliff not affected by construction.	Cliff would be affected by construction of access road, then reinstated.
Installation risk	Geological risk from collapse as bore is supported only by hydraulic pressure.	One-step installation. Greater risk as this is a less established methodology. Lower risk of mud breaking out as fluid operates at a lower pressure.	Suited for difficult ground conditions. Shaft required on cliff top.	Suited for unstable ground conditions. Shaft required on cliff top and cofferdam in nearshore.
Access	Exit location access would form part of the offshore application and would be considered cumulatively with the Project.	Exit location access would form part of the offshore application and would be considered cumulatively with the Project. Jack-up barge would retrieve the boring machine beyond the MLWS limit.	Exit location access would form part of the offshore application and would be considered cumulatively with the Project. Requires entrance shaft at the cliffs and pre-cut trench at MLWS.	Exit location access through the cliffs would be part of the DCO.
Equipment	Specialist equipment available on the market.	Specialist equipment available on the market, but with less supply than HDD.	Specialist equipment to be manufactured specifically for	Specialist equipment to be manufactured specifically for this Project

	HDD	Direct Pipe	Microtunnel	Microtunnel with cofferdam
			this Project ahead of construction start.	ahead of construction start.
Footprint	Small footprint at launch pit and exit location.	Small footprint at launch pit and exit location.	Large and deep shaft to be built at launch site. Small footprint at exit.	Large and deep shaft to be built at launch site. 140m x 3m excavation at exit.

Pre-commissioning and Hydrostatic Testing

- 2.9.209 Following construction, the pipelines would be internally cleaned, gauged, flooded and hydrostatically tested to prove their integrity in accordance with the relevant specifications. The pipeline would be tested in sequential sections as construction works advance.
- 2.9.210 The volume of water required for the hydrostatic testing would be confirmed during detailed design and subject to the final pre-commissioning strategy, with the aim to minimise and reuse water between test sections, as far as practicable. On this basis, it is anticipated that approximately 16,200m³ of water would be required for the hydrostatic testing. At this stage, it is assumed that the water will be tankered between sections.
- 2.9.211 At this stage, the Project is considering potable water and filtered freshwater as options for sources of water. Further studies and stakeholder engagement will be undertaken as the design progresses to explore further and refine these options.
- 2.9.212 Chemical additives (e.g. biocides, corrosion inhibitors, oxygen scavengers) may need to be added to the water to prevent corrosion and biological growth inside the pipeline, depending on the quality and the stay time of the hydrotest water. In all cases, hydrotest water would be discharged to approved locations in a safe manner and treated as required to meet all required environmental requirements.
- 2.9.213 Once the hydrostatic testing has been completed, the water would be disposed of. At this stage, the Project is considering the following options for disposal:
- Sewer.
 - Water treatment facility.
 - Discharge to ground.
 - Discharge to water course
- 2.9.214 All water would be tested during discharge to ensure that the water quality is acceptable and within the required concentrations stated by the relevant regulatory requirement and / or permit.
- 2.9.215 Following pipeline de-watering (after hydrostatic testing), the pipeline would be dried to a pre-specified dew point. This may be achieved by either blowing dry nitrogen or air through the pipeline or vacuum drying. For both drying methods, 'drying spreads' (compressors etc.) would be located at the AGIs or at designated locations along the pipeline route. In addition, subject to the relevant

chemical permit, corrosion inhibitor chemicals may be applied to the inside of the pipeline.

Pipeline Reinstatement

- 2.9.216 Following the completion of the pipeline construction works, temporary working areas would be reinstated and all construction materials removed.
- 2.9.217 Excavated soil would be reinstatement. This would include appropriate ripping of subsoil prior to topsoil placement if compaction has occurred. Topsoil would then be spread in such a way as to ensure that it does not become compacted.
- 2.9.218 Following soil reinstatement, restoration would commence. This would include reseeded of pastureland and reinstatement of field boundaries (e.g. replacement of hedgerow and installation of fences). Watercourse banks and ditches would also be appropriately restored.
- 2.9.219 Areas of open-cut road crossings would also be instated in accordance with the relevant standards and in engagement with the respective Local Highways Department.

Methods for Constructing the Above Ground Installations

- 2.9.220 Construction of the AGIs is anticipated to involve the following sequence of activities:
- Mobilisation, site preparation, establishment of temporary working areas, temporary access and laydown areas.
 - Construction of an access road (where required) and / or upgrading of an existing access way.
 - Installation of below ground works, such as concrete foundations, bases and plinths, below ground pipework and equipment, drainage, ducting, earthing system etc.
 - Installation of above ground assets, including above ground pipework and equipment, electrical, instrumentation and telecommunication cabling, buildings and kiosks, corrosion protection arrangements utility apparatus etc.
 - Installation of pipeline, mechanical instrumentation and electrical equipment.
 - Connection to utilities / services (e.g., electrical, telecommunications etc).
 - Construction of surface water drainage system (where required).

- Provision of site finishes, vehicular access and turning areas, pedestrian access surfacing, installation of fencing, placement of site finishes such as gravel, provision of landscaping and planting as required etc.
- Testing, conducting pre-commissioning activities and commissioning.
- Demobilisation and reinstatement of temporary works areas.

2.9.221 On-site batching of concrete would not be required for the construction of AGIs. Ready mix concrete will be provided by local suppliers, transported to site by road cement trucks and poured into final position on site.

Methods for Constructing the Pump Facility

2.9.222 Construction of the Pump Facility would follow the same basic principles as described for the AGIs above.

2.9.223 The site would first be prepared and, if necessary, the ground would be levelled via grading and / or excavation. This would be followed by piling and excavation for the main foundations of some of the larger elements of the pump facility. Lightly loaded structures would be founded on shallow raft foundations.

2.9.224 Following ground and civil works, the installation of plant such as the pump compressor units, pipework, utilities, and stack and construction of units such as the administration building, and electrical and instrumentation unit would commence. Building erection and plant installation would likely take place as concurrent activities, although larger plant would likely be installed upon the foundations first with ancillary pipeline and connections installed after.

2.9.225 The main plant components for the Pump Facility are likely to be partially constructed off-site. Due to the early stage of design, equipment specifications and sizes are not yet known. However, it is anticipated that approximately 12 abnormal loads may be required to deliver the main assets to be contained at the Pump Facility, such as the pumps.

2.9.226 The vent stack would be prefabricated off-site and comprise a lattice and small-bore pipework up to approximately 2 inch, which would then be brought to site and bolted in place on a concrete base.

2.9.227 The power cable from Salt End to the Pump Station would be terminated and connected to the electrical system on site, which would comprise components (e.g. switchgear, transformer, etc) transported to site and set on hardstand.

- 2.9.228 On-site batching of concrete would not be required for the construction of Pump Facility. Ready mix concrete will be provided by local suppliers, transported to site by road cement trucks and poured into final position on site.
- 2.9.229 The final stages of construction of the Pump Facility would involve similar activities to the AGIs: installing utilities connections; construction of surface water drainage system; site finishes and surrounding landscaping; testing and commissioning and lastly demobilisation of construction plant and reinstatement of temporary working areas.

Method of Constructing the Other Assets

Fibre Optic Cable(s)

- 2.9.230 Typically, the fibre optic cable(s) would be installed parallel to the pipeline in the trench.
- 2.9.231 In some circumstances, such as where there are constraints to the construction working width, it may be necessary to install sections of the fibre optic cable(s) in a separate trench. In this case, a separate trench would be excavated, using a trenching machine. This trench would be within the same construction working width as the pipeline.
- 2.9.232 At trenchless crossing locations, the fibre optic cable(s) would be installed simultaneously with the pipeline (e.g., strapped 500mm above to pipeline, to enable leak detection of the pipeline to operate) or installed in a designated duct / conduit. The duct would be installed separately using a trenchless method and would be within the same working width as the pipeline. The trenchless methods of installing the fibre optic cable would follow the same principles as the methods described for the pipeline installation.
- 2.9.233 At the River Humber crossing, the options for the fibre optic cable vary from the other crossings. Should HDD be pursued, the fibre optic cable would be installed in a separate but adjacent HDD tunnel. If the pipeline is required to be installed via TBM, then the fibre optic cable would be installed in the same system.

Cathodic Protection System

- 2.9.234 The Transformer Rectifier Units (TRU) and the vertical groundbeds associated with the CP system are anticipated to be located within the AGIs and would be installed as part of the AGI construction process.

- 2.9.235 The vertical groundbeds would be installed following the completion of the below-ground pipework installation of the AGI, prior to commencing the foundation and groundworks for the above-ground aspect of the AGI.
- 2.9.236 The TRUs are typically a cabinet-type structure and would likely be placed upon a concrete foundation and would be installed alongside the other above-ground assets within the AGIs.
- 2.9.237 The CP test posts would be installed following completion of the pipeline pre-commissioning works and as part of the reinstatement of the right of way and would involve the excavation of a up to 1m to fix the post in place.

Pipeline Marker Posts

- 2.9.238 The pipeline marker posts would be installed via handheld or otherwise small machinery following pipeline construction works, during the reinstatement process.

Construction Workforce and Equipment

Construction Workforce

- 2.9.239 The number of workers would vary throughout the construction phase depending on the activity/s being undertaken and the staffing approach taken by the contractor.
- 2.9.240 An estimate of the total number of workers involved in key construction phase activities is provided in Table 2-15 below:

Table 2-15 – Estimated Total Number of Construction Workers Involved in Key Construction Phase Activities

Construction activity	Estimated total number of construction workers
Supervision	16
Yard / Temporary Construction Compound operation	19
Survey	7
Clearing	15
Access works	25
Trenching	25

Construction activity	Estimated total number of construction workers
Fabrication	105
Pipeline testing and field joint coating	18
Pipeline installation	25
Pipeline backfilling	18
Re-instatement	33
Pipeline tie-ins	53
Pipeline pre-commissioning	34
Horizontal Directional Drill crossings (excluding River Humber)	21
Horizontal Direction Drill option for the Humber Crossing	120
Tunnel Boring Machine option for the Humber Crossing	200
Microtunnel crossings	25
Auger Bore	25
Temporary construction compound construction	12
AGI Construction	42
Pump Facility Construction	176
Temporary construction compound reinstatement	12

2.9.241 It is estimated that peak construction workforce would be 100 persons per AGI, and 300 persons for the Pump Facility. It is currently not known if these activities would run concurrently. The workforce would be associated with the following activities:

- Ground workers.
- Steel workers.
- Equipment and Piping.
- Electrical, Control and Instrumentation.
- Scaffolding.

- Painting.
- Insulation.
- Welding.
- Testing.

2.9.242 Efforts would be made, where practicable, to use local workforce and supply chain.

Construction Plant and Equipment

2.9.243 A range of construction plant and equipment would be required for the construction phase of the Project.

2.9.244 An indicative list of key construction plant and equipment, along that is anticipated to be required for the construction phase is provided in Table 2-16 below. An update of this data will be provided in the ES.

Table 2-16 – Anticipated Key Construction Plant and Equipment

Plant	Yard Crew	Survey	Clearing	Access Works	Trenching	Fabrication	NDE & Filed Joint Coating	Installation	Backfilling	Re-instatement	Tie Inns	Pre-commissioning	HDD Tunnelling	Auger Bore / MT	Compound Construction	AGI Construction	Compound Reinstatement
Trencher					1											0	0
Sideboom						6		8			12	4				0	0
Backhoe / Excavator – 70t					6												0
Backhoe / Excavator – 50t	1			3	2	4		1	6	4	3	3	1	1	4	3	4
Backhoe / Excavator – 30t			1	3									2	1		3	
40t Bull Dozer			1	6					2	2		1			1	2	1
30t Dozer			1	2	1					2					1	2	1
100t Mobile Crane	1																
80t Mobile Crane	1															1	0
60t Mobile Crane				2						1					1	1	1
Road Roller			2							2							0
Fencing Machine			1	3	6			1	4	2				1	2	2	2
Tipper Truck						6											
Stringing lorries	3																
Low Loaders	3																
Crane Truck													1				0
Drilling Rig	2		1									1	1		1	1	2
AT Telehandler				2						2							
Stone Cart				1						1							
Drainage Machine	2		2	2			2			4				1	4		4
Tractor						10					3	2	1	2			0
Paywelder						3							1	2			

Plant	Yard Crew	Survey	Clearing	Access Works	Trenching	Fabrication	NDE & Filed Joint Coating	Installation	Backfilling	Re-instatement	Tie Inns	Pre-commissioning	HDD Tunnelling	Auger Bore / MT	Compound Construction	AGI Construction	Compound Reinstatement
Internal Clamp						3					3	8	1	2			0
Compressor							2				3		1	2			
Coating Rig												1					0
Super Air Drier										4					4		4
Rotavator / Tiller	2																
Blending Machine																	
Piling Rig														3	3		1
Generator					2												
All Terrain Dump Truck														1	1		
Minor Equipment	33	1		2			2	1	1	2	1		3	13	5	1	

Construction Programme and Working Hours

- 2.9.245 Subject to the DCO being granted, it is anticipated that construction works would commence and be ongoing for approximately four years.
- 2.9.246 An indicative construction programme is provided in Insert 2-12 below. A detailed construction programme would be developed during the detailed design stage.

Activity	Date																																														
	2028						2029												2030												2031												2032				
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Pump Facility construction, testing and commissioning																																															
AGI Construction within Section 3 of the Project route																																															
Pipeline construction within Section 3 of the Project route																																															
Construction of the entry and exit pits for the crossing of the River Humber (assuming TBM method as a worst-case)																																															
River Humber crossing construction works (assuming TBM method as a worst-case)																																															
AGI construction within Section 1 and 2 of the Project route																																															
Pipeline construction within Section 1 and 2 of the Project route																																															

Insert 2-12 – Indicative Construction Programme

- 2.9.247 The sequencing of construction works would aim to be undertaken in the most efficient manner, taking account of technical, environmental, land owner and stakeholder factors wherever reasonable and practicable. Not all locations throughout the route of the Project would be subject to construction works at once. The exact construction programme at each specific location along the route would be developed by the construction contractor during detailed design and engagement with stakeholders would be undertaken where necessary.
- 2.9.248 The Applicant has been considering what preliminary works could be undertaken to facilitate the construction works programme. These works will be discussed with stakeholders at the appropriate time where practicable.
- 2.9.249 Twenty-four-hour working would be required to align with critical work activities such as tunnelling, boring, testing or works associated with offshore interfaces. For the purposes of the EIA to assess the worst-case scenario, it is assumed that 24-hour working could be required at eight of the trenchless crossings along the route trenchless crossing locations, with the 24-hour working expected to last up to four weeks in each location.
- 2.9.250 Throughout the EIA process each environmental discipline will assess the likely significant effects of 24-hour working. Should significant effects be identified, the hours of activity will be constrained as appropriate to mitigate the effects and described within the draft CEMP and Register of Environmental Actions and Commitments (REAC), as identified as being necessary as an output of the EIA and stakeholder engagement.
- 2.9.251 Further detail on the anticipated construction phasing and programme will be provided in the ES.

Construction Material Use and Waste Management

- 2.9.252 An Outline Site Waste Management Plan (oSWMP) will be developed and would accompany the draft Construction Environmental Management Plan (CEMP) that will be submitted with the DCO. This document will set out the overarching framework for the Project to follow the waste hierarchy and to reduce the amount of waste generated and divert waste from being disposed of at landfill, as far as practicable.
- 2.9.253 The construction contractor/s would be responsible for using the oSWMP to develop and implement the full Site Waste Management Plan (SWMP) during detailed design.

- 2.9.254 A summary of the estimated quantities of bulk items of material use and waste generation, as far as is available at the current design stage, is provided in Table 2-17 below.

Table 2-17 – Estimated Quantities of Bulk Materials Used and Waste Generated during Construction

Source / Activity	Description	Hazardous Waste	Mass
Easington Pump Facility and AGIs			
Excavation	Spoil / mud	Non-hazardous	Will be confirmed following testing
	Contaminated Soil	Hazardous	Will be confirmed following testing
	Contaminated Ground Water	Hazardous	Will be confirmed following testing
Site Compound	Removal of Hard Standing	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED
Temporary Construction Compounds	General site waste	Non-Hazardous	Will be confirmed following testing
	Welfare facilities	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
General construction waste	Construction debris and building materials	Non-hazardous	
Packaging Waste	Packaging waste from construction materials	Non-hazardous	
Trial HDD			
Drilling	Drilling Fluids	Non-hazardous	23,000m3
	Drilling spoil / cuttings	Non-hazardous	2200T
	Spent bentonite	Non-hazardous	1200T
	Contaminated soil	Hazardous	Contaminated soil and groundwater resulting from drilling operations cannot be quantified prior to testing, as the extent of contamination will only be known after analysis is conducted.
	Contaminated groundwater	Hazardous	Contaminated soil and groundwater resulting from drilling operations cannot be quantified prior to testing, as the extent of contamination will only be known after analysis is conducted.
Temporary Construction compounds	General site waste	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
	Welfare facilities	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.

Source / Activity	Description	Hazardous Waste	Mass
Site compound	Removal of hard standing	Non-hazardous	7,700T
Access roads	Removal of access roads after construction	Non-hazardous	15,840T
Full HDD			
Drilling	Drilling Fluids	Non-hazardous	90,600m3
	Drilling spoil / cuttings	Non-hazardous	3,400T
	Fibre optic cable spoil	Non-hazardous	2000T
	Spent bentonite	Non-hazardous	4,700T
	Contaminated soil	Hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
	Contaminated groundwater	Hazardous	Contaminated soil and groundwater resulting from drilling operations cannot be quantified prior to testing, as the extent of contamination will only be known after analysis is conducted.
Temporary Construction compounds	General site waste	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
	Welfare facilities	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
Site compound	Removal of hard standing	Non-hazardous	7,700T
Access roads	Removal of access roads after construction	Non-hazardous	15,840T
Tunnelling			
Tunnelling	Spoil / excavated waste	Non-hazardous	150,000T
	Dewatering of ground water / surface water run off	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
	Contaminated soil	Hazardous	Contaminated soil and groundwater resulting from drilling operations cannot be quantified prior to testing, as the extent of contamination will only be known after analysis is conducted.

Source / Activity	Description	Hazardous Waste	Mass
	Contaminated ground water	Hazardous	Contaminated soil and groundwater resulting from drilling operations cannot be quantified prior to testing, as the extent of contamination will only be known after analysis is conducted.
Site compounds	Removal of hard standing	Non-hazardous	95,000T (80,000 at Goxhill, 15,000T at Paull)
Temporary construction compounds	General site waste	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
	Welfare facilities	Non-hazardous	
Temporary drainage removal	Granular material	Non-hazardous	2000T
Concrete batching plant	Concrete washout waste	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
Access roads	Removal of access roads after construction	Non-hazardous	Hold 6
Trenchless crossings			
HDDs x10	Drilling spoil / mud	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
	Drilling fluid	Non-hazardous	
	Spent bentonite	Non-hazardous	
Micro-tunnels / pipe jacks x11	Drilling spoil / mud	Non-hazardous	
	Drilling fluid	Non-hazardous	
Auger bores (guided and non-guided x14)	Drilling spoil / mud	Non-hazardous	
	Drilling fluid	Non-hazardous	
Drilling / tunnelling	Contaminated ground water	Hazardous	Contaminated soil and groundwater / non contaminated groundwater resulting from drilling operations cannot be quantified prior to testing / drilling, as the extent of contamination / dewatering will only be known after analysis is conducted.

Source / Activity	Description	Hazardous Waste	Mass
Drilling / excavation	Contaminated soil	Hazardous	Contaminated soil and groundwater / non contaminated groundwater resulting from drilling operations cannot be quantified prior to testing / drilling, as the extent of contamination / dewatering will only be known after analysis is conducted.
Temporary construction compounds	General site waste	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
	Welfare facilities	Non-hazardous	
Site compounds	Removal of hard standing	Non-hazardous	
Access Roads	Removal of access roads after construction	Non-hazardous	
Trenched pipeline (approx. 108.5km)			
Trenching / excavation	Spoil / excavated material	Non-hazardous	34,000 T
Dewatering	Pumping offsite	Non-hazardous	Mass, frequency and / or composition not known at this stage. An estimate can be made once package / supplier or design information is available in FEED.
Excavation	Contaminated ground water	Hazardous	
Excavation	Contaminated water	Hazardous	
Vegetation clearance	Vegetation	Non-hazardous	
Pipeline	Pipe cuttings / offcuts	Non-hazardous	
General construction waste	Construction debris and building materials	Non-hazardous	
Temporary construction compounds	Welfare facilities	Non-hazardous	
	Mixed general waste	Non-hazardous	
	Removal of temporary compounds	Non-hazardous	
Pipe dumps	Packaging between pipes	Non-hazardous	

Source / Activity	Description	Hazardous Waste	Mass
	Removal of pipe dumps	Non-hazardous	
Welded Joints	Wrapping of heat shrink sleeve	Non-hazardous	
Various concrete	Concrete waste	Non-hazardous	

Biodiversity and Mitigation Areas

- 2.9.255 No details are known at this time, but the design of any biodiversity mitigation areas will be progressed, and the information will be reported in the ES, alongside any Biodiversity Net Gain calculations.

Construction Land Restoration

- 2.9.256 Following the completion of the construction works, temporary working areas would be reinstated and all construction materials removed.
- 2.9.257 Excavated soil would be reinstated. This would include appropriate ripping of subsoil prior to topsoil placement if compaction has occurred. Topsoil would then be spread in such a way as to ensure that it does not become compacted.
- 2.9.258 Following soil reinstatement, restoration would commence. This would include reseedling of pastureland and reinstatement of field boundaries (e.g., replacement of hedgerow and installation of fences).
- 2.9.259 Watercourse banks and ditches would also be appropriately restored. Areas of open-cut road crossings would also be instated in accordance with the relevant standards and in engagement with the respective Local Highways Department.

2.10 Operation of the Project

- 2.10.1 The operational phase of the Project refers to the period of time during which the Project is being used for its intended purpose, i.e., transporting CO₂ from the carbon capture projects to the offshore pipeline. It begins after construction is completed and continues until the pipeline is no longer in use or is repurposed for a different use. The operational design life is expected to be 25 years for this Project.

Pipeline

- 2.10.2 Once the Project commences operation, the pipeline would be protected by restrictions placed on the land over and immediately around the pipeline, hereafter referred to as the 'Permanent Rights Corridor'. These restrictions would either be included in the lease for the pipeline or imposed as restrictive covenants for the benefit of the subsoil land interest within which the pipeline is located.

- 2.10.3 The Permanent Rights Corridor would be judged following construction. This will be the minimum required area over the pipeline to ensure the safety of the pipeline during the operation of the Project.
- 2.10.4 The required Permanent Rights Corridors would be judged following construction and would ordinarily have a total maximum width of approximately 18 m for the mainline, and approximately 12 m for the spur lines. The Permanent Rights Corridor for the power cable running from Salt End to Easington would have a width of up to 10 m, depending on the cable voltage.
- 2.10.5 The Permanent Rights Corridor would restrict excavation, building, or any other activity that can affect operation, safety, and environmental protection of the pipeline. This would also include restricting the planting of species of trees (or similar) for which the root depth could impact the pipeline.
- 2.10.6 The Permanent Rights Corridor would also include rights for NEP to take access and carry out any essential inspection, maintenance and / or repair works to the pipeline, should such works ever be required.

Above Ground Installations

- 2.10.7 The AGIs, would be operated remotely. However, the design would include provisions for the facilities to be operated locally for maintenance purposes or in the case of any unforeseen operating events.
- 2.10.8 The pipelines and associated AGIs would also be regularly maintained to ensure their continued reliability using trained and competent personnel and all work would be strictly controlled.
- 2.10.9 Once construction is complete and prior to commencing operation, the pipeline would be inspected and cleaned using a Pipeline Inspection Gauge (PIG). An initial survey would be undertaken following commencement of operations to establish baseline data on pipeline conditions. This operation would be repeated as part of an operational maintenance procedure. The frequency of pigging during operation would be determined based on a risk-based approach, depending on pipeline conditions, prior inspection data and risk assessments. At this stage, it is anticipated that pigging would be undertaken approximately every five years. This process may involve venting small volumes of CO₂ at the Inlet AGIs, Junction AGIs and the Pump Facility, as there would be CO₂ within the pipework and vessels associated with the PIG launcher / receiver equipment. Venting would be carried out using temporary mobile vents. The mass of CO₂ released to atmosphere from the venting of a pig trap and associated pipework would be approximately 3.5 tonnes. The rate of venting

would be controlled to prevent solids formation and to ensure the safety of Project personnel and the local population, which may lead to a duration of approximately two hours for the venting operation. Preservation of the pig traps would involve a nitrogen fill which would be vented to atmosphere prior to the start of the pigging operation. The mass of nitrogen released to atmosphere from the venting of a pig trap and associated pipework would be approximately 40 kg.

- 2.10.10 In addition, there may be a requirement for emergency venting at AGIs via a mobile mounted stack. This would not be part of routine operations and would only be required in unplanned, emergency scenarios where there is a need to vent components of the transportation system.
- 2.10.11 During operation, a small HVAC system associated with the E&I kiosk would operate continuously to ensure that the electrical equipment within the kiosk remains at the appropriate operating temperature. The anticipated noise levels for the HVAC units is expected to be 85dB at 1m from the kiosk. The AGIs are not anticipated to result in any other noise or vibration emissions during operation, as there are no routine noise or vibration-generating processes or equipment (i.e. large mechanical moving parts or generators etc).
- 2.10.12 It is anticipated that personnel would occasionally pay on-site visits to AGIs to undertake a security check and inspection. This would be infrequent (i.e. a visit approximately once per month) and is assumed to involve an operative/s travelling to each AGI in a vehicle using the existing road network to inspect the site.

The Pump Facility

- 2.10.13 The Pump Facility would be operated by an anticipated maximum of four on-site staff during routine operations. It is anticipated that the staff would journey to the Pump Facility in personal vehicles using the existing road network. The Pump Facility may also require infrequent on-site visits by additional staff for key periodic maintenance activities.
- 2.10.14 As the Pump Facility would be permanently staffed, there would be localised lighting of key areas within the Pump Facility during hours during low-light hours for safety and security.
- 2.10.15 The main operational plant would be the CO₂ pump units, of which four would normally be in operation with one further unit on standby and would only operate should there be unforeseen operating issues.

- 2.10.16 The Pump Facility would have local venting facilities to support maintenance activities, and relieving systems may be provided for unplanned emergency events (e.g., overpressure of the pipeline or failure of a pump unit during operation). In such instances, processes would be put in place whereby the safety valves would operate, and the flow would be vented until further procedural steps are completed (i.e., the carbon capture projects reduce / stop the flow of CO₂ into the pipeline and / or the back-up pump unit is brought into operation). The composition of the gases released through these venting facilities would be over 96 mol% CO₂, with nitrogen, argon and methane / ethane limited to a combined 4 mol%. Water within the fluid is limited to less than 50 ppm mol due to the potential to form carbonic acid, which can corrode the pipeline. Limits for further contaminants are set out in Table 2-18 below.

Table 2-18 – Contaminant Limits for Delivered CO₂ Stream

Contaminant	Limit
Water H ₂ O	≤50 ppm mol
Hydrogen H ₂	≤0.75 mol%
Nitrogen N ₂	Combined limit of ≤4mol%
Argon Ar	
Methane CH ₄ / Ethane C ₂ H ₆	
Oxygen O ₂	≤10ppm mol
Oxides of Sulphur SO _x	≤10ppm mol
Oxides of Nitrogen NO _x	≤5ppm mol
Hydrogen Sulphide H ₂ S	≤5ppm mol
Carbon Monoxide CO	≤1000ppm mol
Mercury Hg	≤0.0025ppm mol
Glycols	≤1ppm mol
Amines	≤1ppm mol
Ammonia	≤10ppm mol
Formaldehyde	≤20ppm mol
Acetaldehyde	≤20ppm mol

Contaminant	Limit
Cadmium	≤0.005ppm mol
Thallium	≤0.012ppm mol
Methanol / Cumulative methanol & Ethanol	≤350ppm mol
Ethanol	≤50ppm mol
Heavy Hydrocarbons	Heavy hydrocarbons should not shift the dew point below that of pure CO ₂ [e.g., n-C ₄ : ≤0.25mol%, n-C ₆ : ≤250ppm, n-C ₁₀ : ≤5ppm].

- 2.10.17 The type of seals used for the CO₂ pump units would be confirmed at the detailed design stage. For the purposes of assessment, unpressurised mechanical seals are assumed as the reasonable worst-case solution. This sealing arrangement would allow a small amount of CO₂ to escape to atmosphere at an estimated rate of 2–20 N litre/min, which is equivalent to 76 tonnes per annum or 0.000447% of the design flow rate of the pipeline. The CO₂ release would be diluted in nitrogen stored on site. Compared to pressurised mechanical seals which only allow trace amount of CO₂ to escape to the atmosphere, unpressurised seals have the advantage of preventing contamination of the main CO₂ stream, which can lead to corrosion inside the pipe downstream.

2.11 Decommissioning Phase of the Project

- 2.11.1 Through robust design and operating maintenance regime the pipeline, AGIs and Pump Facility are anticipated to remain operational for the design life (i.e. 25 years) of the asset and potentially longer.
- 2.11.2 When the pipeline reaches the end of its design life, it would be decommissioned safely. Decommissioning would consider all the relevant environmental legislation and technology available at the time and the methods which would result in the least potential environmental impacts. Any necessary licences and permits would be acquired.
- 2.11.3 Once safely decommissioned, it is anticipated that the pipeline would be left in situ (in order to avoid further disturbance to the soil, land use and environmentally sensitive areas) and permanently removed from service. Sections of the pipeline may be cut and filled with grout, where appropriate. The measures and method of decommissioning would be in accordance with the

relevant regulations, requirements and best practice measures applicable at the point in time of decommissioning phase.

- 2.11.4 The AGIs and Pump Facility would be safely dismantled. It is anticipated that the same type of equipment, machinery and traffic routes would be used for the dismantling works as would be used for construction. Following the dismantling works, all equipment would be removed and the land returned to its former use.

2.12 References

- Ref 2.1 UK Government (2024). Climate Change Act 2008. [online] Legislation.gov.uk. Available at: <https://www.legislation.gov.uk/ukpga/2008/27/contents>
- Ref 2.2 Northern Endurance Partnership. Northern Endurance Partnership Development. Available at: <https://www.gov.uk/government/publications/northern-endurance-partnership-development>
- Ref 2.3 UK Government (2022). Cluster sequencing Phase-2: shortlisted projects (power CCUS, hydrogen and ICC), August 2022. [online] Legislation.gov.uk. Available at: <https://www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-shortlisted-projects-power-ccus-hydrogen-and-icc-august-2022>
- Ref 2.4 British Standard PD 8010-1: British Standards Institute (2015) *Pipeline Systems. Steel pipelines on land – code of practice (+A1:2016)*. Available at: <https://www.thenbs.com/PublicationIndex/documents/details?Pub=BSI&DocID=315849> (Accessed: 26 January 2022)
- Ref 2.5 ISO 13623:2017 - Petroleum and natural gas industries — Pipeline transportation systems <https://www.iso.org/standard/61251.html>
- Ref 2.6 DNV-ST-F101 – Submarine pipeline systems (2021) <https://www.dnv.com/energy/standards-guidelines/dnv-st-f101-submarine-pipeline-systems/>
- Ref 2.7 ASME B31.3 (2024) <https://www.asme.org/codes-standards/find-codes-standards/b31-3-process-piping>

3 Consideration of Alternatives

3.1 Introduction

- 3.1.1 Regulation 14(2)(d) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (“the EIA Regulations 2017”) (Ref 3.1) states the applicant must provide:

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

- 3.1.2 The Overarching National Policy Statement for Energy (EN-1) (Ref 3.2) at 4.3.15 – 4.3.17 reinforces the requirement to consider reasonable alternatives by stating that:

“Applicants are obliged to include in their ES, information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant’s choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility...”

In some circumstances, the NPSs may impose a policy requirement to consider alternatives...

Where there is a policy or legal requirement to consider alternatives, the applicant should describe the alternatives considered in compliance with these requirements.”

- 3.1.3 EN-1 also provides direction on the extent of information that an Applicant should provide on alternatives by stating in Section 4.3 of EN-1:

“The Secretary of State should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security, climate change, and other environmental benefits) in the same timescale as the proposed development.”

“The Secretary of State should not refuse an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site and should have regard as appropriate to the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals.”

“Alternative proposals which are vague, or immature can be excluded on the grounds that they are not important and relevant to the Secretary of State’s decision”.

- 3.1.4 EN-1 section 4.9 sets out the policy guidance for carbon capture and storage (CCS). While this primarily outlines the consenting process for carbon capture plants, the reference to CO₂ transportation states that *“applicants are expected to take into account foreseeable future demand when considering the size and route of their investments. Applicants may therefore propose pipelines with a greater capacity than demand, at the time of consenting, might suggest”*. However, the National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref 3.3) makes reference to the need to consider reasonable alternatives in paragraphs 2.21.23 and 2.21.30 by cross-referencing EN-1.
- 3.1.5 PINS also emphasise the need for an EIA to consider reasonable alternatives and provide guidance on the information that should be provided in ‘Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements’ (2025) (Ref 3.4) and in Nationally Significant Infrastructure Projects: Advice on Preparing Applications for Linear Projects (2025) (Ref 3.5).
- 3.1.6 The evolution of the design and the reasonable alternatives that have been considered up to this stage of Statutory Consultation, are set out in this chapter of the Preliminary Environmental Information Report (PEIR).
- 3.1.7 This chapter also briefly describes the key design development stages undertaken as part of the (now withdrawn) Humber Low Carbon Pipelines project (as introduced in Chapter 2: Project Description), and which provides context to the Project’s design development.

3.2 Project Objectives

- 3.2.1 The HCCP Project is a critical project in support of the UK’s commitment to achieving net-zero greenhouse gas emissions by 2050, as mandated by its legally binding climate policies. By enabling the safe transportation of captured carbon dioxide (CO₂) from industrial sources to secure long-term storage facilities, the pipeline will play a pivotal role in reducing emissions from industrial emitters, where reductions in CO₂ emissions are initially difficult to reduce while maintaining economic viability.

- 3.2.2 Historically a major industrial centre, the Humber region is home to a concentration of heavy industries, including oil refineries, manufacturing, chemical production, and power generation facilities, which collectively contribute a substantial portion of the UK's industrial carbon footprint. The primary objective of the pipeline is to facilitate the safe and efficient transport of captured CO₂ emissions from these high-emission industries to the secure storage sites under the North Sea.
- 3.2.3 By prioritising safety, environmental stewardship and deliverability, the Project aims to deliver a reliable, sustainable, and secure carbon capture infrastructure that contributes to the UK's decarbonisation efforts while fostering long-term environmental benefits.
- 3.2.4 Although these factors have, and will continue to, inform the design of the pipeline, there are several parameters that form the underlying basis of design. These are summarised below:
- Process Safety - The safety of the population residing, living, and working in proximity to the pipeline is at the core of the HCCP pipeline routeing. To aid the routeing exercise, a risk assessment was undertaken in line with industry standards and updated at each major revision of the route to guarantee the safety of the route and achieve a continual risk reduction during pipeline route development. In addition, all requirements of Land Use Planning (LUP) were followed to ensure that the HSE would provide a "Does Not Advise Against" ("DNAA") response to Planning Authorities (PA). As the design develops, this will continue to be a guiding principle.
 - Environmental and Planning Constraints – The design of the pipeline will be continually cognisant of all environmental and planning constraints, with avoidance of constraints, where feasible, forming the basis of routeing. While this has not always been possible, routeing has been developed through areas where there are fewer environmental constraints present.
 - Technical Constraints – The constructability of the pipeline was key to the design, with site visits aiming to confirm the working widths, equipment manoeuvrability and accessibility. Similarly, the number and type of crossings of watercourses and utilities has been, and will continue to be, integral to the design of the Project and pipeline routeing to ensure the financial and technical feasibility of HCCP.

3.3 The 'Do Nothing' Scenario

- 3.3.1 If the Project does not progress, this would result in there being no onshore infrastructure to transport the CO₂ to be captured in the Humber region, see

Chapter 2: Project Description. Without having a means to transport the captured CO₂, the East Coast Cluster's CCS aims could not be progressed.

3.3.2 If the Project's purpose of transporting the captured CO₂ emissions from the UK's highest industrial carbon emitting region to permanent storage, was not realised, the UK's government's legally binding commitment to achieve net zero carbon emissions by 2050 would be significantly compromised.

3.3.3 The limited alternatives to new CCS infrastructure are recognised in the Overarching National Policy Statement for Energy ((EN-1) Ref 3.2) which states:

"The alternatives to new CCS infrastructure for delivering net zero by 2050 are limited. Producing hydrogen through water electrolysis with low carbon power ('green' hydrogen) does not rely on CCS but the government's view is that this method alone will not achieve the scale of low carbon hydrogen production required for net zero. Alternative methods of decarbonising industry include improving energy efficiency, electrification of heat, and fuel switching to hydrogen or biomass as fuel or feedstock. However, these alternatives are limited as many emissions are process emissions. CCS therefore has an essential role to play, either on its own or in combination with measures such as electrification and fuel switching."

3.3.4 As a result, the option to 'do nothing' has to be discounted and will not be assessed further.

Underground Pipeline as the Transportation Method

3.3.5 Underground pipelines are the most common and amongst the safest means of transporting gases and liquids across long distances. In the UK alone, the total length of pipelines is approximately 40,000 km, of which more than 28,000 km transport natural gas. Another advantage of underground pipelines in addition to their effectiveness and safety, is that they are largely invisible, except for the AGIs and short marker posts which can be seen on the side of roads and at field boundary edges. Once installed, pipelines have little impact on land users and the pipeline, and its contents are protected from all weather conditions.

3.3.6 In addition to the advantages of using an underground pipeline as a means of transportation, there is no credible alternative to the HCCP pipeline to carry 17 million tonnes of CO₂ per annum from industrial emitters to a Pump Facility on the east coast of the UK, ready for further transportation offshore.

Routeing to Connect to Carbon Capture Projects

- 3.3.7 The routeing of the Pipeline has been designed to enable a connection to potential carbon capture projects throughout the Humber region and to link to carbon capture projects that were shortlisted by the Department for Energy Security and Net Zero (DESNZ) in the cluster sequencing process in August 2022 (Ref 3.6). The routeing also enables a connection to other potential future carbon capture or CCS transportation projects near Immingham.

The need for Above Ground Installations

- 3.3.8 As discussed in Chapter 2: Project Description, there are various types of AGIs proposed as part of the Project. All would serve as essential components for the safe and reliable operation and maintenance of the pipeline. The AGIs would be located at strategic locations along the pipeline, relating to proximity to carbon capture projects and set intervals along the pipeline length.
- 3.3.9 In accordance with the relevant pipeline design standard (PD 8010), to ensure the safe operation of the pipeline it is imperative that the pipeline system can be isolated at regular intervals via isolation valves, which require above ground infrastructure. This minimises the impact of inventory escaping into the locality, in the unlikely event that there is a loss of containment of the pipeline.
- 3.3.10 The AGIs also provide the essential infrastructure to allow the carbon capture projects to connect to the pipeline, to control and monitor entry of the CO₂ into the pipeline at inlet AGIs, and to link spur lines to the main pipeline at junction AGIs.
- 3.3.11 Junction AGIs also include facilities to commission, inspect, and clean individual sections of the pipeline. Whilst these are strictly required at the start and end of the main pipeline and the spur lines, they may be omitted from the main pipeline at junctions if it can be demonstrated that the required commissioning, inspection, maintenance, and operation can be achieved without them. This will be reviewed as part of the next step of the Project.

The Need for a Pump Facility

- 3.3.12 The Pump Facility compresses the CO₂ for further transportation from the coast all the way to the Endurance field under the sea. No credible alternative exists as this compression is what pushes the fluid through to the offshore pipeline. Compression is also required for the onshore pipeline, but is outside of the scheme, as the compression and associated compressors / pumps will be provided by the Emitters and will be subject to separate consenting processes.

3.4 Design Principles

Temporary Construction Compound Principles

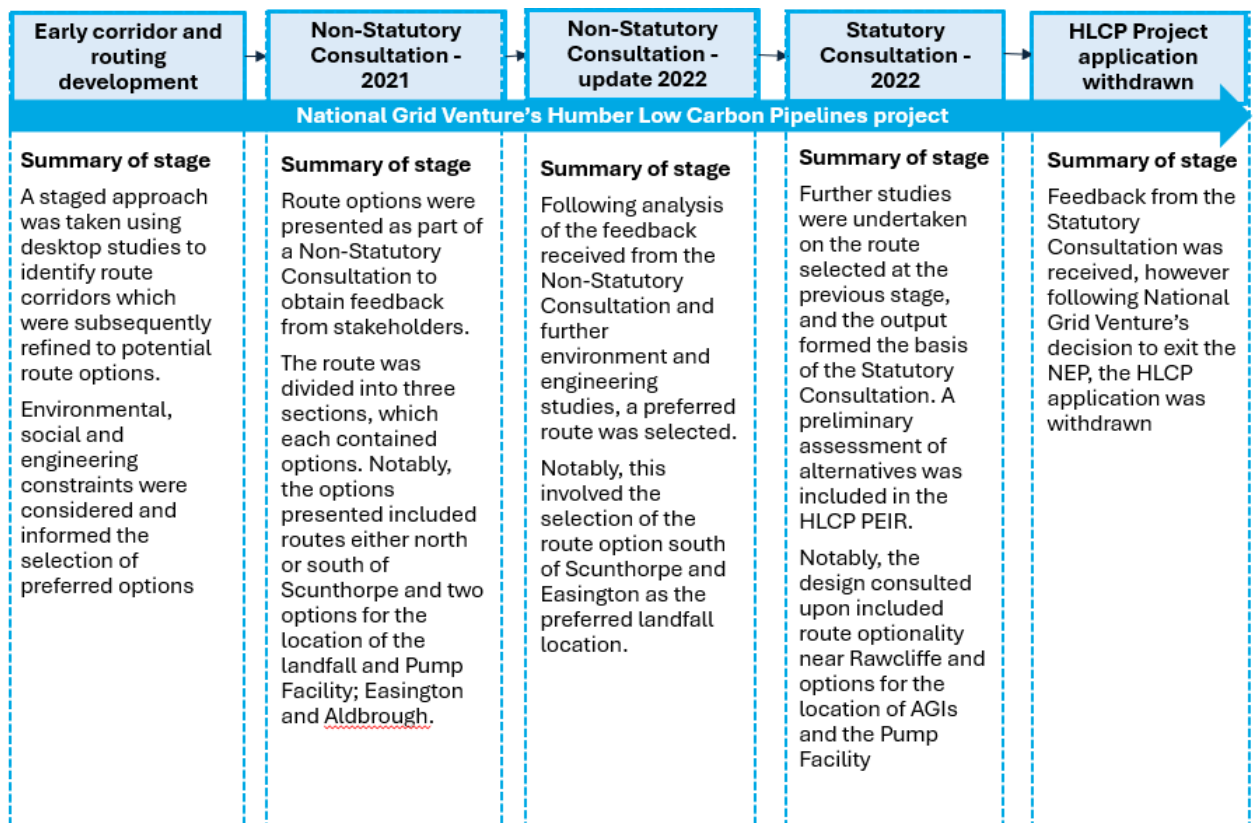
- 3.4.1 The selection of Temporary Construction Compounds (TCCs) will abide by the above principles (as set out in Section 3.2), while also:
- Ensuring adequate room to store and manage construction materials and equipment, to pre-construct elements of the permanent works (e.g. pipe spool arrangements, concrete slabs).
 - Ensuring adequate room to park and maintain vehicles, to set up welfare facilities as well as engineering and administrative buildings, and to tackle any other elements of construction logistics.
 - Ensuring good access to both the public road network and the construction corridor.
- 3.4.2 Additionally, in each Project section, at least one of the compounds must be sufficiently large such that it can store all the line pipe for that section.

AGI Location Principles

- 3.4.3 The selection of potential AGI locations is based on the following factors and criteria:
- Inlet AGIs should be as close as practicable to carbon capture projects.
 - AGIs should be no more than 18.75km apart to follow pipeline isolation requirements, as per *DNV-RP-F104 Design and operation of carbon dioxide pipelines*.
 - AGI locations should account for environmental, social, land use and planning constraints, as far as is reasonably practicable.
 - AGIs locations must be deemed acceptable regarding process safety in the unlikely event of a loss of containment.
 - AGIs should be located such the pipeline length is minimised as far as practicable to minimise their impact, and
 - AGIs should be located outside of areas of high flood risk, as far as practicable.
- 3.4.4 AGIs should be located as close as practicable to potential power and telecommunication connection points. Review of Humber Low Carbon Pipelines
- 3.4.5 National Grid Ventures (NGV) was previously part of the Northern Endurance Partnership (NEP) and promoted the Humber Low Carbon Pipelines (HLCP) project. The HLCP project proposed developing hydrogen and CO₂ pipelines

between Drax in North Yorkshire to the coast north of Easington in the East Riding of Yorkshire, with associated above ground installations. The HLCP project undertook EIA Scoping in April 2022 and Statutory Consultation in October 2022 in anticipation of the submission of the DCO application. The HLCP project is no longer progressing, and National Grid Ventures has since left the NEP. However, the HCLP routing information obtained by NGV was shared with NEP.

- 3.4.6 The Project is different to HLCP. It comprises only a CO₂ transportation pipeline and it is being promoted by a different applicant. Furthermore, it proposes a different route and a modified set of carbon capture projects that it would connect to.
- 3.4.7 There are however shared characteristics between HLCP and the Project, including proposing a CO₂ transportation pipeline between Drax and a Pump Facility North of Easington to provide connection to carbon capture projects throughout the Humber region as part of the wider East Coast Cluster. Therefore, the design development and reasonable alternatives that were considered by the HLCP project, comprise relevant context and an important background to the Project.
- 3.4.8 A summary of the key milestones of the HLCP project are illustrated in Insert 3-1. Information on the design development and reasonable alternatives considered at each milestone is provided below. Further details on the route selection of HLCP is contained within Volume 4, Appendix 3.1: Further Information Regarding the Design Development and Consideration of Alternatives.



Insert 3-1 – Summary of the Key Design Milestones for the HLCP Project

HLCP to HCCP

- 3.4.9 Following the transfer of HLCP to NEP, the feedback from the HLCP Statutory Consultation was reviewed by the environmental, engineering and lands teams to identify options and amendments. A total of 381 change control items were reviewed via workshops. While this had previously been undertaken following the HLCP Statutory Consultation, a review of the change control process was required to ensure that the HCCP design was optimised and will achieve the aims of the new project. The revisit of the HLCP consultation feedback also aimed to reduce the likelihood of repeated comments once HCCP went forward with its own consultation.
- 3.4.10 Solutions and potential alternatives to the design were collaboratively developed and then a desktop environmental and (where information was available) lands appraisal was undertaken upon the proposed design amendment/s to identify the potential risks of the potential change to the Project.
- 3.4.11 In this time, British Steel, which had previously been assumed to be one of the required carbon capture projects, was not shortlisted by DESNZ. The removal

of the project from the shortlist presented the possibility of exploring a shorter route between the Keadby and Killingholme area that passes north of Scunthorpe.

3.4.12 Key change controls from the HLCP Statutory Consultation relating to the section of the route that passes to the south of Scunthorpe were reviewed, to help inform the decision on whether to route to the north of Scunthorpe. A series of feasibility reports were produced by the environmental and lands teams to identify the preferred route for HCCP, utilising the Design Principles as outlined in Section 3.2 above.

3.4.13 While the whole Order Limits for the HLCP project were reviewed and modified, key design changes and decisions are summarised below.

North of Scunthorpe Route Selection

3.4.14 Unlike HLCP, the Project does not seek to provide a connection to British Steel, which was the key driver to route the HLCP pipeline to the south of Scunthorpe. This is because British Steel was not selected for the DESNZ shortlist of projects.

3.4.15 Feedback received from the HLCP Statutory Consultation raised concerns regarding the interaction with constraints south of Scunthorpe, such as mineral allocation sites, historic landfill, and SSSIs.

3.4.16 Both factors led to the exploration of alternative routes, including a shorter and more direct route north of Scunthorpe for the mainline pipeline.

3.4.17 Key alternatives to the HLCP Statutory Consultation design south of Scunthorpe that were explored include the following:

- A route option south of Messingham, to avoid interaction with multiple areas containing minerals, a historic landfill and proximity to SSSIs.
- Two alternative route options near Bigby, to avoid interacting with a site allocated by North Lincolnshire Council for mineral resources, and a planning application associated with a quarry near Kettleby, and
- An option to realign the route near Thornton Curtis to avoid interacting with a potential solar development and an operational livestock farm.

3.4.18 An alternative route to the north of Scunthorpe was also developed, to explore its potential to overcome the constraints associated with the route option south of Scunthorpe. Additionally, this would be a more direct route for the main line pipeline from the west of Scunthorpe to the carbon capture projects to the east.

The Project reviewed the route corridor options to the north of Scunthorpe that were considered in the early stages of the HLCP project and undertook engineering, environmental, social and lands constraints studies to optimise the route. The main environmental constraints identified were the interaction and proximity with environmental designated sites, including the crossing of the River Trent SAC / SSSI / Ramsar, and proximity to the Humber Estuary SPA, SAC, SSSI and Ramsar.

Decision

3.4.19 The north of Scunthorpe route was selected for the following key reasons:

- This route avoids known environmental and planning constraints associated with the route option south of Scunthorpe. Areas avoided include:
 - Mineral sites such as the safeguarded allocated site for sand and gravel deposits east of Brigg (MS 07/08 – Extension to Kettleby Quarry), and
 - Local Wildlife Sites southeast of Scunthorpe (Sweeting Thoms and Broom Plantation) which contain Tree Preservation Orders and deciduous woodland.
- Construction and operational safety are improved by routeing the pipeline away from densely populated residential areas when compared to the south of Scunthorpe route.
- This route is approximately 10km shorter and thereby reduces its environmental impact and societal disruption during construction, reduces construction cost, programme and material requirements, disrupts less agricultural land and landholdings, and would result in the pipeline system requiring fewer AGIs.

3.4.20 Despite crossing sensitive habitats near the River Trent and Humber Estuary, mitigation measures such as trenchless crossing methods and ecological surveys informed the decision to select the north of Scunthorpe route. Further ecological surveys will be undertaken, as the north of Scunthorpe route falls entirely within the 4km impact risk zone as advised by Natural England, which will form the basis of mitigation measures, if required following the outcome of the surveys.

West of Rawcliffe Route Selection

3.4.21 The review of the HLCP Statutory Consultation design and feedback identified constraints associated with the two route options between Rawcliffe and Goole. The eastern route option interacted with the Humber Freeport – Goole Tax Site and a consented planning application for a new industrial facility, while the

western route would increase the potential for environmental and social impacts upon Rawcliffe due to the route's closer proximity.

- 3.4.22 The area between Rawcliffe and Goole was evaluated and ultimately considered not to be a suitable route for the pipeline, due to the constraints of the proximity to the existing built environment (i.e. industrial areas at Goole, settlements of Rawcliffe Bridge and Rawcliffe, and individual properties in the area) and the Humber Freeport – Goole area (and associated consented planning application).
- 3.4.23 Due to the proximity of Goole and the location of the River Ouse to the east, the only viable alternative was a route to the west of Rawcliffe. The main constraints identified were the proximity of the settlements (e.g. Carlton and East Cowick) and the Eskamhorn Meadows SSSI, both of which were avoided via iterative design development.

Decision

- 3.4.24 A revised route to the west of Rawcliffe was selected as this provides a suitable route which avoids the key constraints (proximity to the built environment) associated with area between Rawcliffe and Goole.

North of River Humber Route Refinement

- 3.4.25 The review of the HLCP Statutory Consultation design identified that the route ran in close proximity between the towns of Hedon and Thorngumbald. An engineering review of the design also identified that operational safety and construction time, and cost could be improved by exploring alternative routes between the Humber crossing and the Pump Facility near Easington (Ref 3.7). Feedback from the HLCP Statutory Consultation included residents raising concerns regarding the potential for impacts during construction (such as noise and traffic).
- 3.4.26 The most feasible area to explore a potential route option from the northern bank of the River Humber crossing to the Easington landfall location was the area south of the A1033 due to the presence and required separation of the draft Order Limits from settlements including Hedon, Thorngumbald, Burstwick, Keyingham and Ottringham.
- 3.4.27 Engagement with Natural England has indicated that habitat broadly within 4km of the River Humber is considered functionally linked to the Humber Estuary SPA, SAC, SSSI and Ramsar. Therefore, design development focussed on refining a feasible route from the north of the River Humber that balanced

maintaining a suitable distance from the settlements along the A1033 whilst staying as far as practicable from the River Humber's banks.

Decision

- 3.4.28 A new route was selected, commencing south of the A1033 from the northern bank of the River Humber crossing which balances the need to keep distance from the settlements along the A1033 whilst keeping a minimum of 4km from the River Humber, as far as practicable, to minimise the potential for impacts upon the functionally linked habitat.

Temporary Construction Compounds

- 3.4.29 West Park Industrial Estate Temporary Construction Compound (TCC) was identified under the HLCP project as a vacant plot within the otherwise industrial and developed setting of West Park Industrial Estate. The location was originally identified as an option during the review of the HLCP Statutory Consultation Design, whereby the route passed in close proximity between Rawcliffe and Goole. The location has good transport links and would have provided easy and short access to the route and the construction working width. A desktop environmental appraisal of the site identified that there were no notable constraints.
- 3.4.30 A planning application was subsequently identified as being submitted for this area. Therefore, to avoid potential conflict with this application, this option was discounted.

Above Ground Installations

Drax AGI

- 3.4.31 During HLCP project's Statutory Consultation design, four options were considered for the location of the Drax AGI: Drax AGI Options A, B, C, and D. The Applicant reviewed the HLCP Statutory Consultation options, and the feedback and the following key considerations were identified:
- Feedback from heritage stakeholders raised concerns that Options A and B would result in an expansion of the industrial character of the area, in the context of the Drax Power Station.
 - Options A and B would potentially result in greater landscape and visual impacts upon the residential properties to the east of Drax Power station, due to being closer and having a more direct view from the properties.
 - Options A and B would involve interactions with proposed planning applications, notably the East Yorkshire Solar Farm NSIP.

- Option D would require the AGIs permanent access to cross Carr Dike.

3.4.32 A key point that was raised for all options was the risk of potential impacts upon the setting of Drax Augustinian Priory Scheduled Monument. Options C (now called Drax AGI Option 2) and D (now called Drax AGI Option 1) were taken forward by the Applicant and subsequently refined through design development to optimise their position within the field parcel.

Keadby AGI

3.4.33 During HLCP project's Statutory Consultation design, two options were considered for the location of the Keadby AGI: Keadby AGI Options A and B.

3.4.34 The two locations considered on HLCP were located on an ash mount which is unsuitable for construction and potentially environmentally sensitive. A new location to the south of Warping Drain was selected further to a detailed site evaluation, considering in particular the wind turbine exclusion zones as well as information from the local carbon capture project regarding the layout of the future facilities.

Salt End AGI

3.4.35 HLCP Statutory Consultation identified four options for the location of the Salt End AGI: Salt End AGI Options A – D. During HCCP development, it was identified that the 'Humber Freeport – Hull East' tax site and the proposed Humber International Enterprise Park (HIEP) development application interact with this area.

3.4.36 Options A – C would involve the greatest interaction with the tax site and HEIP application. Feedback from the HLCP Statutory Consultation also noted concerns from stakeholders over the proximity of Option A to Burstwick Drain and Option B to Hedon Haven watercourses. Option D minimised the interaction with the tax site and planning application and provided the shortest distance to the carbon capture project, although it is the closest to the Humber Estuary. For these reasons, Options A – C were discounted, and further engagement with stakeholders was undertaken to confirm that this location would be compatible with their scheme. Further engagement, surveys and design development has been undertaken to minimise the potential impacts of Option D (now called Salt End AGI Option 2). An additional option (Salt End AGI Option 1) is also currently under consideration. More details are in Chapter 2: Project Description.

Retention of HLCP Statutory Consultation Route Design Aspects

- 3.4.37 As part of the Applicant's review of the HLCP Statutory Consultation design, aspects have been retained in the proposal HCCP has taken to consultation. The decision to keep some aspects of the HLCP design is based on the comprehensive evaluation that considered its effectiveness, value, and potential impact. Where design aspects are retained, it signified confidence in its ability to deliver the desired outcomes and alignment with the Project's objectives, alongside efficiency in terms of costs, resources and constructability.
- 3.4.38 In addition, to better organise the Project it was split into three design sections:
- Section 1: The Drax area in the west to the River Trent.
 - Section 2: River Trent to River Humber.
 - Section 3: River Humber to Holderness coast north of Easington.
- 3.4.39 The reasons that the Project has retained key areas of the route are described below:
- **Section 1 – Goole Fields and Keadby Spur** – Consideration of other route alternatives in this area are constrained by the Humber Estuary SPA, SAC, SSSI and Ramsar to the north and the Thorne and Hatfield Moors SPA, SSSI and National Nature Reserve, and an existing wind turbine development to the south. It is considered that there were no other viable alternatives for this portion of the route. Design refinement has sought to avoid the concerns that were raised in relation to field drainage and disruption to the land use in this area via the HLCP Statutory Consultation and the Project's Non-Statutory Consultation.
 - **River Humber crossing location within Section 2** – This location is deemed the most suitable, as it provides the shortest practicable route for the pipeline to connect the nearby carbon capture projects at Killingholme to the south and Salt End to the north of the River Humber. It also takes into account the constraints posed by the existing refinery and port to the east of the Killingholme AGI so as not to limit operations of these sites, individual properties along the banks of the River Humber, as well as the Humber Estuary SPA / SAC / SSSI, Ramsar site and the functionally linked habitats. From an engineering standpoint, the chosen location is advantageous because pipeline crossings have been successfully installed in this area in the past, such as in the River Humber Gas Pipeline Replacement Project. This history provides confidence in the constructability of the crossing. It is considered that there were no other viable alternatives for this portion of the route. Therefore, design

development has focussed on refining the crossing in this location, such as addressing concerns on the HCLP Statutory Consultation design regarding interaction with a historic landfill on the River Humber northern bank.

- **Section 3 – Spur to Salt End AGI** – From the northern River Humber crossing point, the general route of the spur line to provide the required connection to the carbon capture project at Salt End has been retained. Route options in this area are constrained by the presence of individual residential properties and farmsteads and the village of Paull to the west. Furthermore, the Humber Freeport – Hull East and the associated Humber International Enterprise Park development proposal are located broadly between Paull and Salt End Chemicals Park which also constrain route options. Therefore, design development has focussed on refining the route to minimise potential impacts upon these known constraints, working with the developers of the Freeport and the Enterprise Park to identify suitable pipeline routes.
- **Section 3 – Patrington to the Pump Facility** – North of Patrington, where the route crosses the A1033, the Project mainly follows the same path as the design presented during the HLCP Statutory Consultation. Considering the need to connect to the landfall location north of Easington and the constraints of the Humber Estuary SPA, SAC, SSSI, and Ramsar site, as well as the nearby Hodgson's Fields Nature Reserve, settlements of Welwick and Skeffling, and other properties to the south, this chosen route is considered the most suitable option as it is the most direct and maintains adequate separation distance from settlements in this area.
- **The location of the Pump Facility** - A review of the HLCP project's selection process for locating the Pump Facility north of Easington was undertaken. A multidisciplinary review was made of the engineering, environmental and land use constraints. The review was based on the previously shortlisted options of Easington and Aldbrough, as the reasons for discounting the other previously considered locations remained applicable. The additional studies that were undertaken included assessing the landfall's constructability and potential offshore pipeline routes from the Endurance store. This also considered that Easington was the landfall location for the NEP offshore ES (Ref 3.8). The review concluded that Easington remained the most suitable location for the landfall and Pump Facility, for the following key reasons:
 - Offers the greatest construction and execution predictability, minimising construction risk - Easington is a well-understood site with established landfall precedents and extensive existing onshore and offshore development, providing confidence in the geology and predictability of landfall construction costs. In contrast, Aldbrough

lacks any landfall precedent, resulting in uncertainty regarding its geology, which would require significant further study to understand its suitability, increasing the project programme.

- Reduced cost - As described above, the landfall execution predictability is significantly greater for Easington than for Aldbrough, and therefore the cost estimate for the landfall at Aldbrough carries greater uncertainty.
- Environmental – There is a greater understanding of the environmental and land use baseline conditions for the Easington location due to the studies, engagement and surveys that were undertaken as part of the HLCP project. This has identified that the main risks for the Easington location are the need to cross the Dimlington Cliff SSSI, coastal erosion and the potential presence of buried archaeology. The proximity of both sites to the Greater Wash SPA and Holderness Offshore Marine Conservation Zone (MCZ) are considered broadly equivalent, however Aldbrough would require approximately 1.5km deep pre-cut trench through the Holderness MCZ. Surveys and studies are continuing for the Easington site and collaborative design development will seek to mitigate potential impacts, such as via trenchless crossing of the Dimlington Cliff SSSI.
- Lands – The Aldbrough option could require a marginally shorter length of pipeline from the connection to the carbon capture project at Salt End and therefore would cross a lesser extent of land and potentially fewer landowners, including the Crown Estate. However, the Project aims to overcome this risk via careful routing and effective engagement with landowners.

3.5 Identification of HCCP Preferred Order Limits and Non-Statutory Consultation

- 3.5.1 While the transfer of HLCP data has provided the Applicant with key background information, and while they share foundational similarities, HCCP's scope of only the CO₂ pipeline required the review and check of HLCP data. This enabled the Project to address limitations and improve the safety of the HLCP route, creating an updated design and routing to progress the Project. The Project's design development has followed an iterative process to ensure that the Project achieves its aims through an optimal design that seeks to avoid and / or minimise potential safety risks and environmental, social and landowner impacts. It is this updated version of the route that was presented at Non-Statutory Consultation.

3.5.2 Non-Statutory Consultation ran for six weeks from 9 July to 20 August 2024 and was formed of a combination of online and in-person events following a press release, print and digital advertising, and the presentation of material in high-footfall locations, e.g., libraries.

3.5.3 The Order Limits presented at Non-Statutory Consultation were 300m wide, with wider areas along the route to enable further refinement and providing future opportunities for optionality.

New AGI Locations Presented at Statutory Consultation

3.5.4 Changes to the draft Order Limits and therefore the length of the pipeline added the requirement for an additional AGIs and new potential AGI locations.

Eastoft AGI

3.5.5 Four locations were considered as part of the design development process for the Eastoft AGI, although the location is constrained by the presence of wind turbines and Swinefleet Warping Drain to the west, and nearby properties. Options A and B were discounted as although they would allow for a short permanent access track from Quay Lane, these locations would require the mainline pipeline to 'double-back' on itself to towards Swinefleet Warping Drain in order to continue eastwards, due to the presence of residential properties to the east of both locations constraining a direct onwards route to the east.

3.5.6 Option C was discounted as although it would also allow for a short permanent access Quay Lane and would not involve the same issue as the pipeline needing to 'double back' as Options A and B, the close proximity to the residential properties at the junction of Quay Lane and Quart Lane meant that impacts and disturbance was considered likely.

3.5.7 Therefore, the decision to move the AGI further away from the properties towards Swinefleet Warping Drain. Although Option D would involve a longer permanent access track from Quay Lane, this location is preferred when considering the constraints application to the other locations.

Winterton AGI

3.5.8 Due to the distance between AGIs and the requirements for these to be at a certain distance, a new AGI was required in an area south of Winteringham along the pipeline. An area within the proposed TCC is considered a suitable location due to ease of access from the A1077. No significant environmental or planning concerns were identified for this site, and the AGI site was carried

forward to Non-Statutory Consultation. Utilising the proposed TCC site reduces the area of land taken and minimises the number of landowners affected.

Thorngumbald AGI

- 3.5.9 Thorngumbald AGI is required to facilitate the pipeline connection from the potential carbon capture projects at Salt End. The proposed site location was assessed with consideration of several governing factors, exit location of the River Humber crossing, existing infrastructure, including utilities, topography and additional environmental factors.
- 3.5.10 The area is significantly constrained by existing underground gas pipelines and high voltage overhead power lines, and although the proposed site falls within a flood risk zone the AGI will be designed to have no effect on infiltration rates in the area.

3.6 Consideration of Feedback and Further Refinement

Key Project Changes

- 3.6.1 Following the Non-Statutory Consultation, all comments from public bodies and the general public were reviewed. Where concerns were raised around design, these were identified through the 'change control' process. Engineering design was ongoing throughout this period, and these changes have also been incorporated into the current Project design, as discussed in Chapter 2: Project Description.
- 3.6.2 Key Project changes resulting from the Non-Statutory Consultation are described in Table 3-1.

Table 3-1 – Key Project Changes Resulting from the Non-Statutory Consultation

Key Project Change	Reason for the change
A reduction in the draft Order Limits at Drax and the removal of pipeline alignment options considered at the time.	This maintains the distance from the properties to the east of Drax, including maintaining access to these properties.
Changes to the draft Order Limits to the west of Rawcliffe to remove optionality and maintain distance from the village.	The changes to the draft Order Limits provide certainty around the motorway crossing location and ensures adequate area for drainage design.
Straightening of the draft Order Limits north of Eastoft.	Provide furthers separation from the villages.
Moving the draft Order Limits to the south, on the east side of the River Trent. The design has been refined to avoid dykes and flood defences, either by removal from the draft Order Limits or by trenchless crossing.	Provides further separation from Alkborough Flats Local Wildlife Site (LWS), which is functionally linked to the Humber Estuary Ramsar, SPA and SAC site.
Removal of parts of the draft Order Limits to the south of South Killingholme.	Minimises impacts on Mayflower Woods LWS and to avoid interaction with a consented planning application for a data centre.
Reduction in area of the draft Order Limits at Immingham.	Change resulted from discussion and engagement with landowners.
Expansion of the draft Order Limits into Salt End.	Provides optionality for AGI locations.
Expansion of the draft Order Limits north of the River Humber.	Enables potential stringing of the pipeline for the River Humber crossing.
Amendments to the draft Order Limits around Patrington.	Maintains separation distances from the settlement.
The removal of Eastoft TCC.	The location was identified as it provided direct access to the construction working width for the route. However, the subsequent design changes

Key Project Change	Reason for the change
	resulted in the favourable reasons for selection, including location on the pipeline route, no longer applied.
The removal of Flixborough TCC as an option.	A desktop environmental appraisal and feedback from the Project's Non-Statutory Consultation identified that the area is designated as a Local Nature Reserve and contains sensitive habitat and the potential for protected species to be present.
Selection of one option for Drax AGI.	Feedback from the Non-Statutory Consultation showed no strong preference for either option and as both options broadly have the same potential environment and lands impacts. Therefore, as Option 1 could utilise an existing access track without requiring a permanent crossing of the Carr Dike, Option 2 was discounted.

Traffic Access Routes

- 3.6.3 Access for construction vehicles to the south and north bank of the River Humber is required to facilitate crossing works, regardless of which trenchless crossing method is chosen (discussed further in Chapter 2: Project Description).
- 3.6.4 Alternative construction traffic access routes associated with the River Humber crossing construction works have been explored, as this topic was subject to a number of comments from various stakeholders following the HLCP project Statutory Consultation and the Project's Non-Statutory Consultation. Due to the limited existing road network in the region and the relationship between the roads and nearby settlements including Goxhill, South End and East Halton, local residents raised concerns about the impact that construction traffic may have.
- 3.6.5 To minimise the impact on local residents, the following alternatives were considered.

Use of the Public Road Network

- 3.6.6 Following the concerns raised by the residents of the nearby villages at Non-Statutory Consultation, a number of public roads have been assessed for their suitability to support the Project, in particular the crossing of the River Humber.
- 3.6.7 Routes considered for use are:
- Via Ferry Road, Goxhill.
 - Via Skitter Road, East Halton.
 - Via Chapel Field Road, South End.
 - Via Oxmarsh Road, New Holland.
- 3.6.8 It is preferable to keep as many feasible routes open as possible to distribute construction vehicle traffic and reduce the impact on any single route. If a one-way system is adopted for HGV movements, at least two route options as listed above will be required.
- 3.6.9 Consultation feedback received to date notes the route is used regularly by other HGVs and that two HGVs struggle to pass in the residential part of Ferry Road, particularly at a bottleneck area at the North End Junction. It is considered that localised widening and the introduction of passing places would make the route suitable for use, particularly as part of a two-way system.

- 3.6.10 As for Ferry Road, Skitter Road received negative consultation feedback, with responses focusing on the impact of HGV movements on the local primary school, street parking and the single lane Skitter Road. Concern was also raised around the weight restriction on the road, but recent engagement with North Lincolnshire highways suggests that the Project would not be in breach of this weight restriction. The Project is proposing to maintain this option, but ensuring HGV traffic does not pass by the primary school through the exclusion of Mill Lane.
- 3.6.11 Chapel Field Road in South End has the potential to minimise disruption in the area due to South End's comparatively small population. Localised widening and additional passing points along Chapel Field Road would be required, and construction of a bypass on Soff Lane would also be necessary. Previous consultation feedback indicates a local preference for constructing this bypass and retaining it for permanent two-way movements after project completion to alleviate ongoing traffic issues in the region. This option is retained.
- 3.6.12 Access to the River Humber crossing point via Oxmarsh Road has also been explored. However, this option is not recommended for HGV construction vehicle traffic, whether one-way or two-way, due to the poor suitability of Barrow Road and Oxmarsh Lane in New Holland, which contain significant roadside parking and are located close to a local school. The road sits within the flood plain for the River Humber, and significant civils works for the upgrade of private tracks would be required. Although measures can be taken to manage these issues, such as restricting HGV movement times and constructing temporary off-street parking, these concerns demonstrate that New Holland is not a viable alternative to routes previously considered.

Use of the Construction Corridor Haul Road

- 3.6.13 Access to the River Humber crossing construction site could be achieved via the construction corridor haul road. This solution would have the advantage of reducing the extent of the public road network used by the Project.
- 3.6.14 However, this solution would require extensive civil works which may have to remain in place for several years and impact a large number of land users for a much longer duration than in the case where the haul road is only used for pipeline construction. Furthermore, this solution would not eliminate the use of public roads and would cause bottlenecks which would locally severely affect local road users (e.g. around College Road on the south side).
- 3.6.15 The use of the construction haul road as a primary means of supporting the River Humber crossing construction was therefore discarded.

Construction of a Temporary Dock

- 3.6.16 An option of installing a temporary dock along the shoreline, which would serve as a facility for loading and offloading materials at or near the Humber Crossing Tunnel Launch Shaft Site Compound, was considered. This dock could allow construction traffic to bypass nearby public roads that are sensitive to the import and removal of materials to and from the site.
- 3.6.17 However, an appraisal of the potential constraints and constructability of this option was undertaken and concluded that it is not seen as a technically feasible solution for managing construction traffic for the following reasons:
- Major construction work would be required in the River Humber, which has the potential to result in significant environmental effects and a requirement for additional survey and consenting work, due to the River Humber being designated as a SPA, SAC, Ramsar and SSSI. This would add risk, cost and delay to the Project's programme.
 - It is anticipated that the overall cost of constructing the temporary dock facility would be significantly higher than using the existing road network, due to the extent and complexity of works likely required.
 - Most of the materials needed to construct the temporary dock would likely need to be transported by road, using one or more of the routes described above. Consequently, this option would not mitigate the necessity for large HGV construction traffic volumes into the Goxhill region.
- 3.6.18 Considering these factors, constructing a temporary dock facility is not a technically feasible solution to address access challenges in the Goxhill region.

Realignment of the River Humber Crossing

- 3.6.19 Construction activities associated with the River Humber tunnel crossing are expected to generate a significantly larger quantity of HGV vehicle traffic movements at the launch shaft site compound compared to the reception shaft site compound. Switching the location of the launch and reception sites to opposite sides of the River Humber, with the launch shaft site relocated to the north side of the river near Paull, and the reception shaft site relocated to the south side of the river near Goxhill, could reduce effects from traffic on settlements on the south side of the River Humber.
- 3.6.20 While this option is considered technically feasible, it is not a preferred solution due to local geotechnical data, including where the overlying glacial till deposit is thickest on the north side of the River Humber.

- 3.6.21 In addition, this change would introduce more minor challenges and constraints to the project design and construction, such as performing prolonged construction activities in close proximity to existing residential properties, as well as a potential reduction in pipeline string length. This option is therefore discounted.

3.7 Conclusion and Next Steps

- 3.7.1 This chapter has set out how the design of the Project has evolved up to the date of its statutory consultation which coincides with the publication of this PEIR. The chapter describes the reasonable alternatives that have been considered and how options have been chosen. The iterative process of feedback and design amendments played a crucial role in refining the options and the draft Order Limits. By engaging with stakeholders, each alternative was scrutinised and developed to inform the current design.
- 3.7.2 To date, the Project has been designed considering the Project objectives of safety and constructability, while being mindful of environmental constraints. The Project will continue to be guided by these principles, ensuring that the design of the Project maintains the DNAA response from the HSE and minimises environmental impacts.
- 3.7.3 Chapter 2: Project Description describes the current design of the Project. The PEIR will be subject to statutory consultation with specialist and non-specialist consultees from the community and consultation bodies. Feedback from this process will be reviewed and where appropriate the design will be amended. The updated design will be reported in the ES.

3.8 References

- Ref 3.1 HMSO (2017) *The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017*. Available at: <https://www.legislation.gov.uk/ukxi/2017/572/contents> [Accessed 6 Feb. 2025]
- Ref 3.2 Department for Energy Security and Net Zero (2023). *Overarching National Policy Statement for Energy (EN-1)*. [online] Available at: <https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf> [Accessed 7 Feb. 2025].
- Ref 3.3 Department for Energy Security & Net Zero (2023). *National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)*. [online] Available at: <https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9>

[be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf](#) [Accessed 7 Feb. 2025].

- Ref 3.4 Planning Inspectorate. (2020). Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements. [online] Available at: <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-an/nationally-significant-infrastructure-projects-advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-an> [Accessed 7 Feb. 2025].
- Ref 3.5 Planning Inspectorate. (2025). *Nationally Significant Infrastructure Projects: Advice on Preparing Applications for Linear Projects*. <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-preparing-applications-for-linear-projects>
- Ref 3.6 UK Government (2022). Cluster sequencing Phase-2: shortlisted projects (power CCUS, hydrogen and ICC), August 2022. [online] Legislation.go.uk. Available at: <https://www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-shortlisted-projects-power-ccus-hydrogen-and-icc-august-2022>
- Ref 3.7 Northern Endurance Partnership Onshore Pipeline Project, Pump Facility Location Optioneering Report (2023), NS051-PI-REP-527-00002 B01
- Ref 3.8 Northern Endurance Partnership. Northern Endurance Partnership Development. Available at: <https://www.gov.uk/government/publications/northern-endurance-partnership-development>

4 Environmental Impact Assessment Methodology

4.1 Introduction

- 4.1.1 Environmental Impact Assessment (EIA) is the process that identifies the key environmental effects of a development and suggests ways that these effects can be avoided, reduced, or managed. The Environmental Statement (ES) is the document within which the EIA process is reported including identified likely significant effects and associated mitigation measures. This Preliminary Environmental Information Report (PEIR) presents the findings of the assessment to date to enable successful consultation, as required under the Planning Act (2008).
- 4.1.2 This chapter presents the overarching method of environmental assessment for the Project. The specific methodologies for each environmental topic are provided within the individual chapters of this report. The approach to the assessment has been informed by best practice guidance, as set out within Planning Inspectorate (PINS) Advice Note Seven (Ref 4.1).
- 4.1.3 The EIA is being undertaken by an appropriately qualified project team as set out in the EIA Scoping Report. The experience and qualifications of the team are in line with Regulations 14(4)(a) of the EIA Regulations 2017.

4.2 EIA Scoping Opinion and Stakeholder Engagement

- 4.2.1 In preparing this PEIR, reference has been made to the EIA Scoping Opinion received from PINS (on behalf of the Secretary of State (SoS)) (12 February 2025). The advice provided by PINS regarding assessment methodology, topics and the presentation of the ES will be referenced in each of the topic chapters.
- 4.2.2 Consultation and engagement is ongoing with a range of statutory and non-statutory consultees. At present, these include:
- Local authorities.
 - Parish Councils.
 - Statutory bodies (e.g. Environment Agency, Natural England, Historic England, and others).
 - Statutory utilities.
 - Internal drainage boards, and
 - Land-owners and residents potentially affected by the Project.

- 4.2.3 The purpose of consultation and engagement with statutory and non-statutory consultees is to brief them on the Project, seek baseline data, agree the scope of technical assessments and seek their feedback on the proposals. Any items agreed will be identified within the technical chapters.
- 4.2.4 Technical engagement will continue throughout the EIA process, informed by Pre-application Principal Areas of Disagreement Summary Statements (PADSS) and Statements of Common Ground (SoCG) which will be developed in advance of and finalised during the DCO Examination.
- 4.2.5 Non-statutory consultation took place in June 2024 and July 2024. This PEIR forms part of the statutory consultation, as required by the Planning Act 2008 (Ref 4.2) and EIA Regulations and will take place between 27 October and 5 December 2025.
- 4.2.6 The PEIR has been developed to inform consultees with a preliminary assessment of the potential environmental effects of the Project, at the current stage of design development.
- 4.2.7 Consultation events will start in October 2025. These provide the opportunity to offer feedback and / or ask questions about the PEIR. It should be noted that if the dates of the Statutory Consultation period (and any related events) change, this will be advertised.

4.3 Defining the Study Area

- 4.3.1 The Study Area for each environmental topic is set out within its respective chapter of this report (see Chapters 5-21).

4.4 Baseline Conditions

- 4.4.1 The baseline environment includes the existing environmental characteristics and conditions, based on surveys undertaken and information available at the time of the assessment from third party sources and desk-based studies. In this PEIR, the likely significant environmental effects will be described in relation to the extent of changes to the existing baseline environment as a result of the construction, operation and / or decommissioning of the Project. The origins of all third-party data will be clearly outlined, alongside any limitations and assumptions.
- 4.4.2 The ES will present an updated baseline, including the results of any ongoing survey works.

- 4.4.3 Baseline data which is deemed to be confidential, such as that relating to some protected species, will be provided in independent confidential appendices to the PEIR (where available) and the ES due to the sensitivity of species records.
- 4.4.4 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.

4.5 Future Baseline Conditions

- 4.5.1 The EIA regulations require the PEIR and the ES to include a description of the future baseline. As such, this PEIR and the ES will include an outline of the likely development of the existing baseline without the construction or operation of the Project based on available information and knowledge. The future baseline may differ from the existing baseline as a result of any changes to and arising from local plans or policies, new legal obligations that may drive change or wider changes to the environment, such as changes in population or climate change.

4.6 Impact Avoidance and Mitigation

- 4.6.1 The Institute of Environmental Management and Assessment (IEMA), issued “Shaping Better Quality Development” in November 2015 (Ref 4.3) and “Implementing the Mitigation Hierarchy from Concept to Construction” in August 2024 (Ref 4.4). 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 made during the pre-application phase that are an inherent part of the Project.
 - Secondary mitigation – commitments made by the Project that will require further activity to achieve the estimated outcome. The effectiveness of these measures will be assessed within the ES and appropriate mitigation will be secured by the Development Consent Order (DCO). These measures are treated as an inherent part of the Project and where appropriate, will be set out in the draft Construction Environmental Management Plan (Appendix 4.1 CEMP) and the Register of Environmental Actions and Commitments (Appendix 4.2 REAC), and
 - Tertiary mitigation – actions that would be required regardless of the outcome of the EIA. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are standard practices used to manage commonly occurring environmental effects. These may also be captured and presented within the CEMP.

- 4.6.2 The primary mitigation measures will be outlined in Chapter 2: Project Description in the PEIR and ES, and secondary and tertiary mitigation will be presented within the technical chapters for each environmental topic. The assessment of potential likely significant environmental effects will take primary and tertiary mitigation into account.
- 4.6.3 Following assessment of the effects of the Project, any further mitigation measures (secondary mitigation) will be outlined within the technical chapters. These mitigation measures would reduce any adverse effects or enhance valuable effects. The assessment of residual effects will take the secondary mitigation into account, where appropriate secondary mitigation has been identified.
- 4.6.4 A Register of Commitments will document all mitigation to ensure suitable identification and monitoring of mitigation beyond the submission of the DCO.

Construction Environmental Management Plan and Register of Environmental Actions and Commitments

- 4.6.5 The draft DCO will contain a requirement for a CEMP and a Register of Environmental Actions and Commitments (REAC) to secure the relevant mitigation items contained within a Register of Commitments. This PEIR will include a draft of both the CEMP and the REAC.
- 4.6.6 The CEMP would be the means of controlling the construction works and set out monitoring requirements, with the objective of ensuring that the effect of the construction works on people and the natural environment are reduced as reasonably practicable.
- 4.6.7 The REAC contains measures that will be implemented during design, construction, operation and decommissioning of the Project. It will enable the Applicant to communicate environmental actions and commitments to its own organisation and to designers, contractors, operators and users of the Project.

Monitoring

- 4.6.8 The EIA Regulations require, where appropriate, the monitoring of potential significant adverse effects. Where monitoring measures are proposed as part of the mitigation set out, this will be detailed within each of the topic chapters of the ES and detailed within a Register of Commitments. The results of any monitoring would be shared with the relevant organisations.

4.7 Assessment of Potential Significant Effects

- 4.7.1 The design of the Project will continue to be progressed up to the detailed design stage and may continue beyond the submission of the ES. In line with PINS Advice Note Nine (Using the Rochdale Envelope) (Ref 4.5) a limit of deviation and a parameter-based approach (the “Rochdale Envelope” approach) will be adopted to define the envelopes in which the construction and operation of the Project would be undertaken. This allows for flexibility within the design and ensures a ‘worst-case’ approach to the assessment.
- 4.7.2 The detailed design and construction methodology for the Project will be developed within the limits of deviation and parameters and therefore will not need further assessment (though design approvals will be required to confirm compliance with the limit of deviation and parameters).
- 4.7.3 The ES will report on the likely significant effects of the construction, operation (including maintenance) and decommissioning phases of the Project, and will confirm the maximum dimensions of the Project.
- 4.7.4 The following criteria will be considered when determining significance:
- Likelihood of occurrence.
 - Geographical extent.
 - Adherence of the proposals to legislation.
 - Adherence of the proposals planning and marine policy.
 - Adherence of the proposals to international, national and local standards.
 - Sensitivity of the receiving environment or other receptors.
 - 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).
 - Inter-relationship between effects (both cumulatively and in terms of potential effect interactions), and
 - The outputs of stakeholder and public engagement.
- 4.7.5 The methodology for assessing the significance of an effect will vary between environmental factors but will be based on the environmental sensitivity (or value / importance) of a receptor and the magnitude of change from baseline conditions. Topic-specific guidance requires that discrete criteria or scales for determining significance are utilised.

- 4.7.6 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 within the topic specific chapters.
- 4.7.7 In addition to the above, professional judgement will be used to define the significance. Significance will be rated on a scale of Neutral, Minor, Moderate and Major effects. Only Moderate and Major effects will be considered to be significant.
- 4.7.8 Tables which summarise the likely significant effects will be provided. These tables will outline sensitive receptors, mitigation measures and residual effects. A distinction will be made between direct and indirect; short, medium and long-term; permanent and temporary; and positive and negative effects.
- 4.7.9 The ES will include details of difficulties (for example, technical deficiencies) encountered when compiling the required information and the main unknowns involved.

4.8 Assessment of Cumulative Effects

- 4.8.1 In accordance with the EIA Regulations, consideration is given to the potential for cumulative effects to occur as a result of the Project.
- 4.8.2 The consideration of cumulative effects is a fundamental part of undertaking an EIA and understanding the potential changes perceived by receptors. It plays an important role in considering the wider picture of potential significant environment effects that may occur as a result of the Project.
- 4.8.3 Best practice for the assessment of cumulative effects is set out within PINS Advice Note Seventeen (Ref 4.6).
- 4.8.4 The assessment will consider the following types of cumulative effects:
- Intra-project combined effects – the interaction and combination of different residual (post-mitigation) environmental effects of the Project affecting the same Receptor, and
 - Inter-project cumulative effect – the residual (post-mitigation) environmental effects of the Project combining and interacting with the residual environmental effects of “committed developments.” This will include, where relevant, considering the potential for cumulative effects to occur as a result of the Project interacting with other infrastructure projects.

- 4.8.5 The approach to the Cumulative Effects assessment is presented in Chapter 21: Assessment of Cumulative Effects.

4.9 Assessment of Transboundary Impacts

- 4.9.1 Regulation 32 of the EIA Regulations sets out the procedural duties required where the Secretary of State deems that a Nationally Significant Infrastructure Project (NSIP) is likely to have significant effects on the environment in a European Economic Area (EEA) State; or where an EEA State deems that its environment is likely to be significantly affected by an NSIP. Further guidance is provided in the PINS Advice Note (Ref 4.6).
- 4.9.2 Given the geographic scope (i.e. that it is an onshore pipeline contained within a single region of England) and nature (i.e. that it is a buried underground pipeline) of the Project, it is not considered that significant effects on the environment to an EEA state are likely. The nearest EEA State is the Netherlands approximately 320km east, across the North Sea. Therefore, at present, transboundary impacts will not be assessed within this PEIR or the subsequent ES.
- 4.9.3 This will be closely monitored, and the Project will be mindful of any new or materially different information which may introduce transboundary impacts as determined with PINS within the EIA Scoping Opinion. If this were to occur, the necessary information relevant to transboundary impacts, and the associated assessment, would be provided within the ES.

4.10 Coordination of Assessments

- 4.10.1 A number of additional assessments will not directly form part of the ES but will be relied upon and referred to within the ES. Relevant documents will be submitted in support of the Application. These will be as follows:

Biodiversity Net Gain Assessment

- 4.10.2 The Project is committed to the delivery of BNG in line with the likely forthcoming Government guidance / legislation for NSIPs. For information regarding the Biodiversity Net Gain assessment, refer to Chapter 7: Ecology and Biodiversity.

Habitats Regulations Assessment

- 4.10.3 The overarching aim of the Habitats Regulations Assessment (HRA) is to determine, in view of a site's conservation objectives and qualifying interests, whether a plan, either in isolation and / or in-combination with other projects, could lead to adverse effects on the integrity of an International Site. Given the proximity of the Project to several international Sites, a HRA will be prepared. This will provide the consenting authority with sufficient information to decide whether the Project will lead to Likely Significant Effects (LSE) on International Sites.
- 4.10.4 Where 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. 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 PEIR has been developed to ensure that the needs of these processes have been considered to ensure a coordinated assessment.
- 4.10.5 The Habitat Regulations Assessment accompanies the PEIR as a supporting document.

Water Framework Directive Screening Report

- 4.10.6 The Water Framework Directive (WFD) Screening Report will screen for both the potential construction and operational impacts of the Project upon the relevant WFD quality elements for several surface waterbodies, a transitional waterbody, a coastal waterbody and objectives of the Humber River Basin Management Plan, and groundwater resources.
- 4.10.7 This includes identifying likely risks to biodiversity, the biological, physico-chemical and hydromorphological quality of watercourses and groundwater quality and quantity, and the likely ability of good-practice methods to manage risks associated with pollutants typically experienced during construction and during the operational phase.
- 4.10.8 The WFD Screening Report will determine the need for a full WFD assessment. If required, the scope for a WFD assessment will be discussed with the Environment Agency.
- 4.10.9 The WFD Screening Report accompanies the PEIR as a supporting document.

Flood Risk Assessment

- 4.10.10 A Flood Risk Assessment (FRA) will be prepared to support the EIA in accordance with the National Planning Policy Framework (NPPF) (Ref 4.7). The FRA will assess the potential implications of the Project on flood risk to people and property elsewhere, as well as assessing the potential risk of flooding to the Project.
- 4.10.11 A strategic approach to the potential impacts and sensitive receptors along the route will be undertaken due to the scale of the Project. However, a more detailed assessment will be undertaken if required at specific locations of the proposals (e.g. AGIs).

4.11 Artificial Intelligence

- 4.11.1 Artificial intelligence (AI) has not been used in the production of this PEIR, nor within the assessments undertaken to date. If this changes, all uses will be recorded and noted within the ES.

4.12 References

- Ref 4.1 – The Planning Inspectorate (2020). *Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements*. Available at; [Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements - GOV.UK](#)
- Ref 4.2 – HM Government (2008) *Planning Act 2008*. Available at: [Planning Act 2008](#)
- Ref 4.3 – Institute of Environmental Management and Assessment (IEMA) (2015). *EIA Guide to Shaping Quality Development*. Available at: [IEMA Guidance Documents EIA Guide to Shaping Quality Development V6.pdf](#)
- Ref 4.4 – Institute of Environmental Management and Assessment (IEMA) *Implementing the Mitigation Hierarchy from Concept to Construction* (2024). Available at: [iema-mitigation-in-eia-guidance-final.pdf](#)
- Ref 4.5 – The Planning Inspectorate (2018). *Advice Note Nine: Rochdale Envelope*. Available at; [Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope - GOV.UK](#)
- Ref 4.6 – The Planning Inspectorate (2024). *Nationally Significant Infrastructure Projects: Advice on Transboundary Impacts and Process*.

Available at: [Nationally Significant Infrastructure Projects: Advice on Transboundary Impacts and Process - GOV.UK](#)

- Ref 4.7 – Ministry of Housing, Communities & Local Government (2012) *National Planning Policy Framework (NPPF)*. Available at: [National Planning Policy Framework - GOV.UK](#)

5 Agriculture and Soils

5.1 Introduction

- 5.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Agriculture and Soils. The preliminary assessment is based on information obtained to date.
- 5.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, environmental measures, and the preliminary effects on agricultural land, soils and agricultural landholdings that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 5.1.3 The receptors which have been identified as having potential impacts from the temporary and permanent land take of the Project are as follows:
- Agricultural land:
 - Best and Most Versatile (BMV) land¹.
 - Non BMV land.
 - Soils:
 - Soil function and volume.
 - Soil structure (compaction resulting from soil handling).
 - Soil temperature (from the heat emission of the pipeline).
 - Agricultural landholding:
 - Severance and disruption to farming activities.
- 5.1.4 This chapter should be also read in conjunction with:
- Chapter 6: Air Quality in relation to the effect of soil dust and relevant mitigation measures.
 - Chapter 7: Ecology and Biodiversity with regard to the designated sites and invasive non-native species in relation to soils.
 - Chapter 8: Climate Resilience in relation to climate change and soils.
 - Chapter 9: Greenhouse Gases in relation to emissions from agriculture, soils and land use change.
 - Chapter 10: Ground Conditions and Hydrology in relation to soil contamination.

¹ Best and most versatile agricultural land: Land in grades 1, 2 and 3a of the Agricultural Land Classification (Ministry of Housing, Communities and Local Government, 2025) National Planning Policy Framework <https://www.gov.uk/government/publications/national-planning-policy-framework--2> .

- Chapter 12: Landscape and Visual in relation to soil and landscape design and establishment.
- Chapter 14: Socio-economics, Recreation and Tourism with regard to agricultural land take in relation to the effect on private property.
- Chapter 17: Materials and Waste in relation to soil as construction waste and
- Chapter 18: Hydrology and Land Drainage in relation to existing farmland drainage infrastructure and soils.

5.1.5 This chapter is supported by the following figures:

- Volume 3 - Figure 5.1: National Soil Map.
- Volume 3 - Figure 5.2: Provisional Agricultural Land Classification Map.
- Volume 3 - Figure 5.3: Agri-environment Schemes Map.
- Volume 3 - Figure 5.4: Forestry and Woodland Schemes Map.

5.1.6 This chapter is supported by the following appendices

- Volume 4 - Appendix 5.1: Outline Soil Management Plan.

5.2 Legislation, Policy and Guidance

Legislation

5.2.1 Legislation relevant to the EIA of agricultural land and soils is detailed in Table 5-1.

Table 5-1 – Summary of Legislation relevant to Agriculture and Soils

Legislation	How it is considered within this PEIR
The Agricultural Land (Removal of Surface Soil) Act (1953) (Ref 5.1)	Section 1 of This Act states that ‘Removal of surface soil without planning permission to be an offence against this Act. (1) If- (a) a person removes surface soil from agricultural land with a view to the sale of that soil, and (b) the removal of that soil constitutes development within the meaning of [the Town and Country Planning Act 1990], and is carried out without the grant of permission required in that behalf under Part III of that Act, and (c) the quantity of soil so removed in any period of three months amounts to more than five cubic yards, he shall be guilty of an offence against this Act. (2) Subsection (1) of this section shall not apply to the cutting of peat or to the removal of so much surface soil as it is reasonably necessary to remove in the course of cutting turf. (3) The reference in subsection (1) of this section to agricultural land shall include a reference to land the use of which for agriculture has been discontinued in consequence of the intention to remove surface soil from that land.’ This PEIR will assess the impacts on agricultural land and soils and develop mitigation measures and an Outline Soil Management Plan (SMP) to minimise the impact on agricultural land and soils, in particular minimising the need to remove soils off-site. Details of volumes of soils to be stripped, stockpiled and reinstated will be set out in a Detailed SMP, which will be submitted by the contractor pre-construction.
Environment Act 2021(Ref 5.2)	‘An Act to make provision about targets, plans and policies for improving the natural environment; for statements and reports about environmental protection; for the Office for Environmental Protection; about waste and resource efficiency; about air quality; for the recall of products that fail to meet environmental

Legislation	How it is considered within this PEIR
	standards; about water; about nature and biodiversity; for conservation covenants; about the regulation of chemicals; and for connected purposes.' This PEIR will assess the impacts on agricultural land and soils and develop mitigation measures to minimise impacts.

Policy

National Planning Policy

- 5.2.2 National Planning Policy that guided the EIA relevant to agriculture and soils, and how the policies were considered in the assessment, is detailed in Table 5-2.

Table 5-2 – Summary of National Planning Policy relevant to Agriculture and Soils

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 5.3)		
Paragraph 5.11.12	‘Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5).’	The extent of BMV land within the draft Order Limits will be determined through the Agricultural Land Classification (ALC) survey. Where practicable, land of lower quality will be used in preference to that of higher quality.
Paragraph 5.11.34	‘The Secretary of State should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification. Where schemes are to be sited on best and most versatile agricultural land the Secretary of State should take into account the economic and other benefits of that land. Where development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality.’	The extent of BMV land within the draft Order Limits will be determined through the ALC survey, to be reported in the Environmental Statement (ES). Where practicable, land of lower quality will be used in preference to that of higher quality.
Paragraphs 5.11.13-5.11.15	‘Applicants should also identify any effects and seek to minimise impacts on soil health and protect and improve soil quality taking into account any mitigation measures proposed. Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination. The sustainable reuse of	The preliminary impact on soil loss, soil function and soil quality is reported within the PEIR and further within the ES, informed by the soil and ALC surveys. An Outline SMP will be submitted in support of the Development Consent Order (DCO) application and will be further developed in line

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination. Developments should contribute to and enhance the natural and local environment by preventing new and existing developments from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.'	with industry good practice and the evolution of the design during the DCO, post consent and preconstruction.
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref 5.4)		
Paragraph 2.21.42	'New pipelines will be installed in a variety of geological conditions. It will be important for applicants to understand the soil types and the nature of the underlying strata, as well as the organic content of different soils.'	The soil and ALC surveys (to be reported in the ES) investigate and characterise soil properties to understand soil types. The information on soil types will be fed into the Outline SMP. Where organic or peaty soils are identified, relevant soil management measures will be incorporated into the Outline SMP. Where peat is identified via the soil and ALC surveys, an additional peat survey may be necessary, and a separate Outline Peat Management Plan (PMP) may be developed.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Paragraphs 2.22.11-2.22.13	'Mitigation measures to minimise any adverse effects on soil and geology should include measures to ensure that residual impacts on the surface are minor. Mitigation measures should include appropriate treatment of soil (in particular topsoil and soil with high organic content) during site construction and other infrastructure activity, and appropriate soil storage and reinstatement in line with the principles and practices outlined in the Code of Practice for the Sustainable Management of Soils on Construction Sites and the Agricultural Land Classification which provides guidelines on soil handling and restoration criteria and land quality. Applicants are encouraged to develop and implement a Soil Resources and Management Plan which could help to use and manage soils sustainably and minimise adverse impacts on soil health and potential land contamination...'	An Outline SMP will be submitted to support the DCO application and will be further developed in line with industry good practice and the evolution of the design during the DCO, post consent and preconstruction. Where organic soils are identified, relevant soil management measures will be incorporated into the Outline SMP. Where peat is identified via the soil and ALC surveys (to be reported in the ES), an additional peat survey may be necessary, and an Outline PMP may be developed.
National Planning Policy Framework (NPPF) (Ref 5.5)		
Paragraph 180	'Planning policies and decisions should contribute to and enhance the natural and local environment by: a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified	The extent of BMV land within the draft Order Limits will be determined through the ALC survey (to be reported in the ES). Where

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	quality in the development plan); (b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;..... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.'	practicable, land of lower quality will be used in preference to that of higher quality. The preliminary impact on soil loss, soil function and soil quality will be assessed within this PEIR. An Outline SMP will be submitted in support of the DCO application and will be further developed in line with industry good practice and the evolution of the design during the DCO, post consent and preconstruction.
Footnote 62 of Paragraph 181	'Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality. The availability of agricultural land used for food production should be considered, alongside the other policies in this Framework, when deciding what sites are most appropriate for development.'	Where practicable, land of lower quality will be used in preference to that of higher quality according to the outcome of the ALC survey (to be reported in the ES).

Local Planning Policy

- 5.2.3 Local Planning Policies within the jurisdictions of North Yorkshire, East Riding of Yorkshire, North Lincolnshire and North East Lincolnshire, relevant to the assessment of agriculture and soils and how they were considered in the assessment, is detailed in Table 5-3.

Table 5-3 – Summary of Local Planning Policy relevant to Agriculture and Soils

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby Local Plan (North Yorkshire Council, 2024) (Ref 5.6)	Policy SG4 - Development in the Countryside (Strategic Policy)	'The Council will seek to ensure that the former Selby district area remains a special place to live by supporting development which protects and enhances the intrinsic character and beauty of the countryside, recognising the important role it plays in the local economy, for the health and well-being of local residents and as a biodiversity resource... Best and Most Versatile Agricultural Land A. The best and most versatile agricultural land will be protected by; 1. Avoiding the irreversible loss of the best and most versatile agricultural land (Grade 1 to 3a) where possible; and 2. Avoiding the irreversible loss of Grade 1 agricultural land unless there are exceptional circumstances where the benefits of the proposal significantly outweigh the loss of land....'	The extent of BMV land within the draft Order Limits will be determined through the ALC survey (to be reported in the ES). Where practicable, land of lower quality will be used in preference to that of higher quality.
East Riding of Yorkshire Local Plan (Ref 5.7)	Policy S4: Supporting development in Villages and the Countryside	'Policy S4: Supporting development in Villages and the Countryside A. Outside of the settlements listed in Policy S3, development will be supported to help maintain the vibrancy of Villages (listed in Appendix B) and the Countryside where it: 1. Is of an appropriate scale to its location taking into account the need to support sustainable patterns of development; 2. Encourages the re-use of previously developed land where appropriate; and 3. Does not involve a significant loss of best and most versatile agricultural land.'	The extent of BMV land within the draft Order Limits will be determined through the ALC survey (to be reported in the ES). Where practicable, land of lower quality will be used in preference to that of higher quality.
	Policy EC5: Supporting the energy sector	'Proposals for the development of the energy sector, excluding wind energy but including the other types of development listed in Table 7, will be supported where any significant adverse impacts are addressed satisfactorily and the residual harm is outweighed by the wider benefits of the proposal. Developments and their associated infrastructure should be acceptable in terms of: ... 3. The effects of development on: ... vii. the land, including land stability, contamination and soil resources.'	An Outline SMP will be submitted in support of the DCO application and will be further developed in line with industry good practice and the evolution of the design during the DCO, post consent and preconstruction. Where peat is identified via the soil and ALC surveys (to be reported in the ES), an additional peat survey may be necessary, and an Outline PMP may be developed.
North Lincolnshire Local Development Framework Core Strategy (Ref 5.8)	Paragraph 4.28	'The Local Development Framework will achieve this by providing a policy framework that supports the reduction in the consumption of non-renewable resources. This includes fossil fuels, land, soil and minerals. As part of this it will be important to ensure that the use of suitable previously developed land is maximised, where possible. The framework will also	The extent of BMV land within the draft Order Limits will be determined through the ALC survey (to be reported in the ES). Where practicable, land of lower quality will be used in preference to that of higher quality.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		support measures to minimise pollution and improve air, soil and water quality, and ensure that adequate infrastructure is available to serve new development. It will also promote the use of renewable energy and more energy efficient developments.'	An Outline SMP will be submitted in support of the DCO application and will be further developed in line with industry good practice and the evolution of the design during the DCO, post consent and preconstruction.
North East Lincolnshire Local Plan 2013 to 2032 (Ref 5.9)	Policy 5 Development boundaries	'Development boundaries are identified on the Policies Map. All development proposals located within or outside of the defined boundaries will be considered with regard to suitability and sustainability, having regard to: ... G. the quality of agricultural land;'	The extent of BMV land within the draft Order Limits will be determined through the ALC survey (to be reported in the ES). Where practicable, land of lower quality will be used in preference to that of higher quality.
	Policy 31 Renewable and low carbon infrastructure	'2. Proposals for renewable and low carbon energy generating systems will be supported where any significant adverse impacts are satisfactorily minimised, and the residual harm is outweighed by the public benefits of the proposal. Developments and their associated infrastructure will be assessed on their merits and subject to the following impact considerations, taking account of individual and cumulative effects: H. the land, including land stability, contamination, soils resources and loss of agricultural land.'	The extent of BMV land within the draft Order Limits will be determined through the ALC survey (to be reported in the ES). Where practicable, land of lower quality will be used in preference to that of higher quality. An Outline SMP will be submitted in support of the DCO application and will be further developed in line with industry good practice and the evolution of the design during the DCO, post consent and preconstruction.

Guidance

5.2.4 The assessment of agriculture and soils has been carried out in accordance with the following guidance:

- The Department for Environment, Food & Rural Affairs (Defra)'s Safeguarding our Soils. A strategy for England (Ref 5.10) outlines the Government's approach to soil protection. The strategy is in line with the NPSs, NPPF, and local policies on soil protection. The assessment on soils will follow this strategy, along with relevant national and local policies throughout the EIA.
- A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018) (Ref 5.27) sets out comprehensive and long-term approach to improving land management and soil health.
- Guide to assessing development proposals on agricultural land (Ref 5.11) from Natural England provides guidance on assessing agricultural land, including BMV land, and sets out the requirement for consultation with Natural England.
- Design Manual for Roads and Bridges (DMRB) LA109: Geology and Soils set out criteria on assessing impact on agricultural land (Ref 5.12).
- Institute of Environmental Management and Assessment in A New Perspective on Land and Soil in Environmental Impact Assessment (Ref 5.13) set out methodologies and criteria on assessing impact on soils.
- Design Manual for Roads and Bridges (DMRB) LA112: Population and human health (Ref 5.14) provides a methodology and criteria on assessing the sensitivity of and magnitude of impact on agricultural land holding.
- Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction from British Society of Soil Science (Ref 5.15) provides a guidance note to help promote the protection of soils and their important functions they support within the planning system and the development of individual sites.
- Defra's Construction Code of Practice for the Sustainable Re-use of Soils on Construction Sites (Ref 5.16) provides guidelines for soil mitigation measures in construction.
- Good Practice Guide for Handling Soils in Mineral Workings from the Institute of Quarrying (Ref 5.17) provides practical soils handling applications of best practice.
- BS 3882:2015 Specification for topsoil (Ref 5.18) provides topsoil handling guidelines.
- BS 8601:2013 Specification for subsoil and requirements for use (Ref 5.19) provides subsoil handling guidelines.

5.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 5.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses are outlined in Table 5-4 below.

Table 5-4 – Summary of Scoping Opinion relevant to Agriculture and Soils

Section Reference	Matter	Comments	Response
ID 3.1.1	Applicant's proposed matters to scope out - Agricultural land and agricultural land holdings –operational phase	The Scoping Report concludes that there would be no effects on agricultural land during operation as the land required temporarily during construction would have been returned to agriculture and landowners /tenants. It states that land required permanently for Above Ground Installations (AGIs) and the Pump Facility would have been taken out of agricultural use during the construction phase. On this basis, the Inspectorate agrees that significant effects are not likely and that this matter can be scoped out. However, the applicant's attention is drawn to ID 3.1.3 below.	Noted.
ID 3.1.1	Applicant's proposed matters to scope out - Disturbance to soils – operational phase	The Scoping Report acknowledges that minimal disturbance to soils and agricultural land holding during operation could occur as a result of maintenance and repair activities, but states that these are likely to be limited in scale and temporary. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.	Noted.
ID 3.1.3	Permanent impacts	The Scoping Report identifies the potential for permanent impacts e.g. on agricultural land and soil function, which would be assessed in the construction	The permanent impact on agricultural land and soil functions will be fully assessed

Section Reference	Matter	Comments	Response
		phase assessment (i.e. the phase within which the impact occurs). The applicant should ensure that any permanent impacts that arise during the construction phase are clearly identified as extending beyond the construction phase to ensure that the duration and consequently, the significance of effect, can be clearly understood. This comment applies to all matters and aspects assessed within the ES. With this in mind, the Inspectorate agrees with the advice of Natural England presented in Table 5-11 of the Scoping Report that the assessment should “consider the potential permanent loss of BMV agricultural land as a result of the damage to the soil resource during construction, causing a downgrading of the ALC grade”.	and reported in the ES. This will be based on the full ALC survey (to be reported in the ES) data and take into account permanent land take. Mitigation measures for agricultural land, soils (including aftercare beyond the construction phase) and agricultural land holding are presented in this chapter and Appendix 5.1: Outline Soil Management Plan, which will be further developed and reported in the ES.
ID 3.1.4	Compaction of soils	The potential for soil compaction from soil excavation, stripping, stockpiling and reinstatement is identified in paragraph 5.10.4 of the Scoping Report. Compaction from the presence of construction vehicles or heavy machinery should also be considered in the assessment, where significant effects are likely to occur.	This will be assessed and reported in the ES in accordance with the methodology and criteria stated in Table 5-8 – Sensitivity of Soils in Relation to Handling / Disturbance in Section 5.4 Assessment Methodology once the ALC survey report is

Section Reference	Matter	Comments	Response
			complete and soil data is available.
ID 3.1.5	BMV land	The ES should contain a clear tabulation of the areas of land in each BMV classification to be temporarily or permanently lost as a result of the proposed development, with reference to accompanying map(s) depicting the grades. Specific justification for the use of the land by grade should be provided. Consideration should be given to the use of BMV land in the applicant's discussion of alternatives.	The areas of BMV (ALC Grades 1, 2 and 3a) and non-BMV land from temporary land take is presented in Table 5-14 – Agricultural Land Classification Grades in this chapter and assessed in Section 5.7 Preliminary Assessment of Potential Impacts. The areas of BMV land from permanent land take will be assessed and reported in the ES along with the ALC survey report.

Summary of Engagement

- 5.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 5-5 below.

Table 5-5 – Summary of Stakeholder Engagement Relevant to Agriculture and Soils

Consultee	Date and method of engagement	Summary of Issues Raised	Response
Natural England	Consulted via email on November 13 th , 2024 and feedback received on January 23 rd , 2025	The following issues should be considered and, where appropriate, included as part of the ES: • The degree to which soils would be disturbed or damaged as part of the development. • The extent to which agricultural land would be disturbed or lost as part of this development, including whether any BMV agricultural land would be impacted.	These have been considered, and the assessment criteria have been established in Section 5.4 Assessment Methodology. These issues have been assessed in this chapter based on the information available at this time and will be fully assessed and reported in the ES once all baseline information collection is complete.
		Where an ALC and soil survey of the land is required, this should normally be at a detailed level, e.g. one auger boring per hectare, (or more detailed for a small site) supported by pits dug in each main soil type to confirm the physical characteristics of the full depth of the soil resource, i.e. 1.2 metres. The survey data can inform suitable soil handling methods and appropriate reuse of the soil resource where required (e.g. agricultural reinstatement, habitat creation, landscaping, allotments and public open space).	The soil / ALC surveys will be conducted in accordance with Agriculture Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land (Ref 5.19) and the Soil Survey Handbook (Ref 5.20). Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation and Appendix 5.1: Outline Soil Management Plan will be updated and reported in the ES once the ALC

Consultee	Date and method of engagement	Summary of Issues Raised	Response
			survey report is complete, and soil data is available.
		The ES should set out details of how any adverse impacts on BMV agricultural land can be minimised through site design / masterplan.	This will be reported in the ES.
		The ES should set out details of how any adverse impacts on soils can be avoided or minimised and demonstrate how soils will be sustainably used and managed, including consideration in site design and master planning, and areas for green infrastructure or biodiversity net gain. The aim will be to minimise soil handling and maximise the sustainable use and management of the available soil to achieve successful after-uses and minimise off-site impacts.	This has been considered in the design in Chapter 2: Project Description, Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation and Appendix 5.1: Outline Soil Management Plan. This will be further updated and reported in the ES.
Environmental Agency	Consulted via email on November 13 th , 2024 and feedback received on January 31 st , 2025	Section 5.10.7, it states: “During operation, soil temperatures around the pipeline may be increased as a result of higher fluid temperatures within the pipeline.” Heat is defined as a pollutant under the Environmental Permitting Regulations 2016 (as amended) and is subject to regulatory controls. If fluid temperatures within the pipeline can affect soil,	This has been scoped in and the assessment of this potential impact will be fully reported in the ES.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		we consider that they can also affect groundwater. Recommendation: please scope this into the assessment.	

5.4 Assessment Methodology

Baseline Data

Study Area

- 5.4.1 The Study Area for agriculture and soils comprises the area within the draft Order Limits, as shown in Volume 3 - Figure 1.1 Project Location, which would be directly affected by the Project through disturbance to agricultural land and soils and disturbance or severance to farming activities.
- 5.4.2 The Study Area includes the following areas:
- Construction working width including trenches.
 - Above Ground Installations.
 - Pump Facility.
 - Stringing areas for Horizontal Directional Drilling (HDD).
 - Construction Compounds and access roads, and
 - Temporary Haul roads.

Baseline Data Collection

- 5.4.3 The baseline data collection will be undertaken via desk study and field survey.

Desk Study Sources

- 5.4.4 Baseline conditions have been established through a desk study using the following sources:
- Post 1988 Agricultural Land Classification (England) (Ref 5.19).
 - Aerial imagery to establish land use along with information from land agency (Ref 5.21).
 - Land Cover Map 2024 (10m classified pixels, GB) (Ref 5.22) for land use information.
 - National Soil Map of England and Wales (Ref 5.23).
 - Agricultural Land Classification – Provisional (England) (Ref 5.24).
 - Agri-environment Schemes and Forestry and Woodland Schemes, as shown on Multi-Agency Geographic Information for the Countryside (MAGIC) mapping (Ref 5.24), and
 - Likelihood of Best and Most Versatile (BMV) Agricultural Land - Strategic scale maps (Ref 5.25).

Site Visits and Surveys

- 5.4.5 A detailed ALC and soil survey was conducted between 2023-2025. The survey data provides detailed baseline information to inform the design and the assessment of the impacts on agricultural land quality and soils and also enables the development of mitigation measures and an Outline SMP.
- 5.4.6 The surveys were undertaken in accordance with:
- Agriculture land classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land (Ref 5.19).
 - Soil Survey Handbook (Ref 5.20), and
 - Natural England consultation opinion.

Impact Assessment Methodology

- 5.4.7 The impact on BMV and non-BMV agricultural land within the draft Order Limits has been assessed in accordance with DMRB LA109 (Ref 5.12). The impact on soils is assessed in accordance with IEMA Guidance, “A New Perspective on Land and Soil in Environmental Impact Assessment” (Ref 5.13). The impact on agricultural landholdings has been assessed in accordance with DMRB LA112 (Ref 5.14).
- 5.4.8 Table 5-6 to Table 5-13 set out the criteria which have been used to determine the sensitivity, the magnitude of impact and the effects on agricultural land, soils and agricultural land holdings.

Sensitivity

- 5.4.9 The criteria for assigning sensitivity is presented within Tables 5-6 to 5-9.

Table 5-6 – Sensitivity of Agricultural Land

Sensitivity	Description
Very High	ALC grade 1 & 2.
High	ALC grade 3a.
Medium	ALC grade 3b.
Low	ALC grade 4 & 5; and / or soils supporting non-designated notable or priority habitats.
Negligible	Previously developed land formerly in 'hard uses' with little potential to return to agriculture.

Table 5-7 – Sensitivity of Soils

Sensitivity	Soil Resource and Soil Functions
Very High	• Biomass production: ALC Grades 1 & 2. • Ecological habitat, soil biodiversity and platform for landscape: soils supporting protected features within a European site (e.g., SAC, SPA, Ramsar 2); Peat soils; soils supporting a National Park, or Ancient Woodland. • Soil carbon: peat soils. • Soils with potential for ecological / landscape restoration. • Soil hydrology: Very important catchment pathway for water flows and flood risk management. • Archaeology, Cultural Heritage, Community Benefits and Geodiversity: Scheduled Ancient Monuments (SAMs) and adjacent areas; World Heritage and European designated sites; soils with known archaeological interest; soils supporting community / recreational / educational access to land covered by National Park designation. • Source of materials: important surface mineral reserves that would be sterilised (i.e., without future access).
High	• Biomass production: ALC Grade 3a. • Ecological habitat, soil biodiversity and platform for landscape: soils supporting protected features within a UK designated site (e.g., United Nations Educational, Scientific and Cultural Organisation Geoparks, SSSI or Area of Outstanding Natural Beauty (AONB), Special Landscape Areas (SLAs) and Geological Conservation Review sites); Native Forest and woodland soils; Unaltered soils supporting seminatural vegetation. • Soil carbon: organo-mineral soils (e.g., peaty soils). • Soil hydrology: important catchment pathway for water flows and flood risk management. • Archaeology, Cultural Heritage, Community Benefits and Geodiversity: Soils with probable but as yet unproven (prior to being revealed by construction) archaeological interest; historic parks and gardens; Regionally Important Geological Site (RIGS); Soils supporting community / recreational / educational access to RIGS and AONBs.

² SAC- Special Areas of Conservation. SPA - Special Protection Areas. Ramsar is a wetland site designated of international importance especially as Waterfowl Habitat under the Ramsar Convention

Sensitivity	Soil Resource and Soil Functions
	• Source of materials: Surface mineral reserves that would be sterilised (i.e., without future access).
Medium	• Biomass production: ALC Grade 3b. • Ecological habitat, soil biodiversity and platform for landscape: Soils supporting protected or valued features within non-statutory designated sites (e.g., LNRs³, Local Geological Sites (LGSs), Sites of Nature Conservation Importance (SNCIs), SLAs⁴; Non-Native Forest and woodland soils. • Soil carbon: Mineral soils. • Soil hydrology: Important minor catchment pathway for water flows and flood risk management. • Archaeology, Cultural Heritage, Community Benefits and Geodiversity: Soils with possible but as yet unproven (prior to being revealed by construction) archaeological interest; Soils supporting community / recreational / educational access to land. • Source of materials: Surface mineral reserves that would remain accessible for extraction.
Low	• Biomass production: ALC Grade 4 and 5. • Ecological habitat, soil biodiversity and platform for landscape: Soils supporting valued features within non designated notable or priority habitats / landscapes. • Agricultural soils. • Soil carbon: Mineral soils. • Soil hydrology: Pathway for local water flows and flood risk management. • Archaeology, Cultural Heritage, Community Benefits and Geodiversity: Soils supporting no notable cultural heritage, geodiversity nor community benefits; Soils supporting limited community / recreational / educational access to land. • Source of materials: Surface mineral reserves that would remain accessible for extraction.

³ LNRs - Local Nature Recovery Strategies.

⁴ SLAs-Special Landscape Areas.

Sensitivity	Soil Resource and Soil Functions
Negligible	As for low sensitivity, but with only indirect, tenuous, and unproven links between sources of impact and soil functions.

Table 5-8 – Sensitivity of Soils in Relation to Handling / Disturbance

Sensitivity of Topsoil and Subsoil	Soil Texture, Field Capacity Days (FCDs) and Wetness Class
High sensitivity (low resilience to structural damage)	• Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams) and organo-mineral and peaty soils where the FCD are 150 or greater. • Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where the FCDs are 225 or greater. • All soils in wetness class (WCV or WCVI).
Medium sensitivity (medium resilience to structural damage)	• Clays, silty clays, sandy clays, heavy silty clay loams, heavy clay loams, silty loams and organo-mineral and peaty soils where the FCDs are fewer than 150. • Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where FCDs are fewer than 225. • Sands, loamy sands, sandy loams and sandy silt loams where the FCDs are 225 or greater or are in wetness classes WCIII and WCIV.
Low sensitivity (high resilience to structural damage)	• Soils with a high sand fraction (sands, loamy sands, sandy loams and sandy silt loams) where the FCDs are fewer than 225 and are in wetness classes WCI to WCII.

Table 5-9 – Criteria for Sensitivity of Agricultural Land Holding

Sensitivity	Description
Very high	• Areas of land in which the enterprise is wholly reliant on the spatial relationship of land to key agricultural infrastructure. • Access between land and key agricultural infrastructure is required on a frequent basis (daily).
High	• Areas of land in which the enterprise is dependent on the spatial relationship of land to key agricultural infrastructure. • Access between land and key agricultural infrastructure is required on a frequent basis (weekly).
Medium	• Areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure. • Access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly).
Low	• Areas of land which the enterprise is not dependent on the spatial relationship of land to key agricultural infrastructure. • Access between land and key agricultural infrastructure is required on an infrequent basis (monthly or less frequent).
Negligible	• Areas of land which are infrequently used on a non-commercial basis.

Magnitude of Effect

- 5.4.10 The criteria for assigning the magnitude of effect is presented within Tables 5-10 to 5-11.

Table 5-10 – Criteria for Magnitude of Impact Agricultural Land

Magnitude of Impact (Change)	Typical description
Major	Physical removal or permanent sealing of soil resource or of >20ha of agricultural land.
Moderate	- Physical removal or permanent sealing of 1ha - 20ha of agricultural land. - Permanent loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource).
Minor	Temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource).
Negligible	No discernible loss / reduction of soil function(s) that restrict current or approved future use.
No change	No loss / reduction of soil function(s) that restrict current or approved future use.

Table 5-11 – Criteria for Magnitude of Impact on Soils

Magnitude of Impact (Change)	Description of Impacts Restricting Proposed Land Use
Major	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20 ha or loss of soil-related features set out in Table 5-7, as advised by other topic specialists in EIA team (including effects from 'Temporary Developments*') or

Magnitude of Impact (Change)	Description of Impacts Restricting Proposed Land Use
	Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20 ha or gain in soil-related features set out in Table 5-7, as advised by other topic specialists in EIA team (including effects from 'temporary developments'*).
Moderate	- Permanent, irreversible loss of one or more soil functions or soil volumes, over an area of between 5 and 20 ha or loss of soil-related features set out in Table 5-7, as advised by other topic specialists in EIA team (including effects from 'Temporary Developments'*) - or - Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5 and 20 ha, or gain in soil-related features set out in Table 5.4, as advised by other topic specialists in EIA team.
Minor	- Permanent, irreversible loss over less than 5 ha or a temporary, reversible loss of one or more soil functions or soil volumes), or temporary, reversible loss of soil-related features set out in Table 5-4 above, as advised by other topic specialists in EIA team - or - Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5 ha or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features set out in Table 5-7, as advised by other topic specialists in EIA team.
Negligible	No discernible loss or reduction or improvement of soil functions or soil volumes that restrict current or proposed land use.
* Temporary developments can result in a permanent impact if resulting disturbance or land use change causes permanent damage to soils.	

Table 5-12 – Criteria for Magnitude of Impact of Agricultural Land Holding

Magnitude of Impact (Change)	Description of Impacts Restricting Proposed Land Use on Private Property and Housing, Community Land and Assets, Development Land and Businesses and Agricultural Land Holdings
Major	• 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 highway assets. • Introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision.
Moderate	• 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 property, businesses, community assets or agricultural holdings; and / or • Introduction (adverse) or removal (beneficial) of severe severance with limited / moderate accessibility provision.
Minor	• 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 resulting in changes to operating conditions that do not compromise overall viability of property, businesses, community assets or agricultural holdings; and / or • Introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.
Negligible	• Very minor loss or detrimental alteration to one or more characteristics, features, or elements. e.g. acquisition of non-operational land or buildings not directly affecting the viability of property, businesses, community assets or agricultural holdings; and / or • Very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision.

Magnitude of Impact (Change)	Description of Impacts Restricting Proposed Land Use on Private Property and Housing, Community Land and Assets, Development Land and Businesses and Agricultural Land Holdings
No Change	• No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction.

Significance

5.4.11 The significance matrix for soils and agriculture is presented in Table 5-13.

Table 5-13 – Significance Matrix

Nature of Receptor (Sensitivity / Value / Importance)	Nature of impact (Magnitude / Probability / Reversibility)				
	No change	Negligible	Minor	Moderate	Major
Very High	Neutral	Slight	Moderate or large	Large or very large	Very large
High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

5.4.12 The definition of the significance category in Table 5-13 is described as follows:

- Very Large: Effects at this level are material in the decision-making progress.
- Large: Effects at this level are likely to be material in the decision-making progress.
- Moderate: Effects at this level can be considered to be material in the decision-making process.
- Slight: Effects at this level are not material in the decision-making process.
- Neutral: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

5.4.13 The effects of very large, large and moderate are considered to be significant.

Assumptions and Limitations

- 5.4.14 The assessment of agricultural land, soils and agricultural landholding is in accordance with methodologies and criteria of industry standards and professional bodies, which are best industry practice. Where there are no industry standard criteria, professional judgement was made based on the best available information.
- 5.4.15 This preliminary assessment on the impact on agriculture and soils was based on the baseline data and the Project design available. The preliminary assessment will be further developed and refined following statutory consultation, the evolution of Project design and the progress of the baseline data collection throughout the EIA stage. A full assessment will be presented in the ES.
- 5.4.16 The assessment of the impact on soils and crops from the heat emission of the pipeline will be based on the relevant research outcome, similar previous project experience and professional judgment as this is a new topic and no standard assessment methodologies and criteria on this have been established.

5.5 Baseline Conditions

Existing Baseline

Land Use and Agricultural Land Holding

- 5.5.1 Agricultural land holding information collected, Land Cover Map 2023 and satellite imagery indicates that the land within the draft Order Limits is predominantly in agricultural use.
- 5.5.2 The majority of agricultural land within the draft Order Limits is in arable use with small areas of grassland and woodland as shown in Volume 3 - Figure 5.3: Agri-environment Schemes Map and Volume 3 - Figure 5.4: Forestry and Woodland Schemes Map.
- 5.5.3 The collection of information on agricultural land holding is still in progress. Complete agricultural land holding information used for the full assessment will be presented in the ES.

Agricultural Land Quality and ALC Grades

- 5.5.4 Table 5-14 summarises the ALC Grades within the draft Order Limits from Volume 3 - Figure 5.2: Provisional Agricultural Land Classification Map.
- 5.5.5 The Provisional ALC (Ref 5.24) shows that the majority of the agricultural land within the draft Order Limits falls under the ALC Grades 1 and 2 as shown in Table 5-14 and Volume 3 - Figure 5.2: Provisional Agricultural Land Classification Map, with some agricultural land being mapped as ALC Grade 3 (split between 3a and 3b) and small areas as ALC Grade 4.
- 5.5.6 The preliminary results of the detailed ALC indicate that the areas of ALC Grade 1 and 2 land is significantly smaller than predicted by the Provisional ALC. Full mapping is not available at the time of writing. A comprehensive analysis and comparison will be presented in the ES on completion of the final ALC report.

Table 5-14 – Agricultural Land Classification Grades

ALC Grades	Provisional ALC	Detailed ALC	
	Area/ha	Ha	%
1	100.1	13.7	2.7%
2	261.3	60.7	12%
3	94	N/A	N/A
3a	N/A	57.7	11.4%
3b	N/A	250	49.4%
4	6.1	4.6	0.9%
5	0	-	-
Non- agriculture	19.3	59.7	11.8%
Others		31.4	6.2%
Un-surveyed		27.8	5.5%
Total		505.5	-
BMV (1, 2& 3a)		132.1	26.1%
Non-BMV (3b, 4&5)		254.5	50.3%

Soils

5.5.7 The National Soil Map of England and Wales (Ref 5.23) indicates that there are twenty-two Soil Associations present within the draft Order Limits as shown in Volume 3 - Figure 5.1: National Soil Map and as follows:

- Foggathorpe 2 is dominated by slowly permeable clayey and fine loamy over clayey stoneless soils on glaciolacustrine clay.
- Romney consists of calcareous, coarse silty soils formed in marine alluvium.
- Blackwood is dominated by deep permeable sandy and coarse loamy soils in glaciofluvial drift.
- Fladbury 3 are stoneless clayey, fine silty and fine loamy soils affected by groundwater.
- Newport 1 consists mainly of well-drained medium sandy soils formed in glaciofluvial and river terrace deposits and, in a few places, stoneless, aeolian sand.
- Blacktoft is dominated by calcareous fine silty soils in marine alluvium.
- Aberford is shallow, locally brashy, well-drained calcareous fine loamy soils over limestone. There are some deeper calcareous soils in colluvium.
- Banbury is well drained brashy fine and coarse loamy ferruginous soils over ironstone. Some deep fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging are present.
- Wallasea 1 is deep stoneless non-calcareous and calcareous clayey soils. Soils locally have humose or peaty surface horizons. Groundwater controlled by ditches and pumps. Flat land. Slight risk of flooding.
- Aswarby is shallow permeable calcareous fine loamy soils over limestone, some affected by groundwater. Some slowly permeable seasonally waterlogged clayey soils.
- Kexby consists mainly of very permeable fine sandy stoneless soils in aeolian sand over clay at a depth of 2 to 3 m.
- Burlingham 2 is dominated by fine loamy soils with slowly permeable subsoils formed in chalky till.
- Landbeach consists mainly of permeable calcareous and non-calcareous loamy soils which are affected by groundwater and overlie chalky glaciofluvial and river terrace drift.
- Andover 1 is shallow well drained calcareous silty soils over chalk on slopes and crests. Deep calcareous and non-calcareous fine silty soils in valley bottoms. Striped soil patterns locally.
- Swaffham Prior is well drained calcareous coarse and fine loamy soils over chalk rubble. Some similar shallow soils. Deep non-calcareous loamy soils

in places. Striped and polygonal soil patterns locally. Slight risk of water erosion.

- Hunstanton is dominated by well drained fine and coarse loamy, often reddish soils in loamy till.
- Wick 1 is well drained coarse loamy and sandy soils locally over gravel. Some similar soils affected by groundwater. Slight risk of water erosion.
- Saline 1 are soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.
- Newchurch 2 is deep stoneless mainly calcareous clayey soils. Groundwater controlled by deep ditches and pumps. Flat land. Risk of flooding in places.
- Holderness consists mainly of slowly permeable fine loamy and moderately permeable coarse loamy soils on chalky till and glaciofluvial drift.
- Bishampton 1 consists of deep, occasionally waterlogged, slowly permeable, fine loamy soils and well drained coarse and fine loamy soils, in glaciofluvial, glaciolacustrine, and river terrace drift.
- Wallasea 2 consists of deep stoneless clayey soils. Calcareous in places. Some deep calcareous silty soils. Flat land often with low ridges giving a complex soil pattern. Groundwater controlled by ditches and pumps.
- Flint is reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Some similar fine loamy soils and some slowly permeable seasonally waterlogged fine loamy over clayey soils.

Future Baseline

- 5.5.8 Climate change will be the main factor affecting the future baseline conditions within the draft Order Limits. Climate change is likely to impact soil conditions and agricultural land as a result of temperature increases and changing patterns and extremes in precipitation and drought such as wetter, stormier winters and drier summers. This is projected to happen not only within the draft Order Limits but at regional, national and global scales.
- 5.5.9 This may impact soil properties and land capacity to some extent. Recent research on changes in land capability for agriculture under climate change in Wales (Hannam, et al., 2025) indicates that there would be an increase in the proportion of land with better agricultural potential in 2020 (2010–2039) and 2050 (2040–2069) compared to the baseline, becoming more favourable for agriculture due to decreased soil wetness.

- 5.5.10 No detailed research on land capability for agriculture under climate change in the North of England was found. However, it is considered that the future baseline conditions within the draft Order Limits, including soil main characteristics and agricultural land quality (ALC grades), will largely remain consistent with the existing baseline conditions within the Project life.

5.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 5.6.1 As stated in Chapter 2: Project Description and Chapter 3: Consideration of Alternatives, the design of the pipeline is continually cognisant of all environmental and planning constraints, with avoidance, where feasible, forming the basis of routeing.
- 5.6.2 The design development of the Project has followed an iterative process to ensure that the Project achieves its aims through an optimal design that seeks to avoid and / or minimise potential safety risks and environmental, social and landowner impacts.
- 5.6.3 Chapter 2: Project Description provides the current design details of the restoration of the disturbed land and soils. The designed depth of the pipeline will be approximately 1.2 m depth below the surface. This will enable soils to be reinstated to the required depth to restore ALC grades (which is predominantly determined by soil properties within 1.2 m).
- 5.6.4 In compliance with NPS EN-1, EN-4 and NPPF on minimising the impacts on the BMV land and soil health, and sustainable reuse of soils, an ALC survey has been conducted within the draft Order Limits to identify the ALC grades and soil resources, to be reported in the ES.
- 5.6.5 In addition, the Outline SMP (Appendix 5.1: Outline Soil Management Plan) has been developed to set out the strategy, approach, methodology and guidance for soil mitigation. This is a key requirement for the development of a Detailed SMP pre-construction for soil handling during construction. This would enable agricultural land and soils to be restored to previous quality and functionality for agricultural use.
- 5.6.6 Severance may arise in some agricultural land holdings during the construction as a result of the working width which may leave parts of field inaccessible or form a barrier between farm fixed assets and land, resulting in disruption to

farming activities. Temporary access will be provided after discussion with the landowners on land access requirements.

Embedded Mitigation

- 5.6.7 The main impacts on agriculture and soils will result from the permanent and temporary loss of agricultural land, disturbance of agricultural land and soils, and disruption and severance of agricultural activities.
- 5.6.8 Table 5-15 outlines the embedded mitigation measures for agricultural land and soils during the preconstruction and the construction phases. The Outline SMP (Appendix 5.1: Outline Soil Management Plan) further details these mitigation measures. Any works resulting in the disturbance of soils and / or agricultural land during the operation phase would be undertaken in accordance with good practice guidelines in place at the time of the works.
- 5.6.9 During the decommissioning phase, it is anticipated that the pipeline would be left in situ in order to avoid further disturbance to soils, land and environmentally sensitive areas. Any works resulting in the disturbance of soils and / or agricultural land during decommissioning would be undertaken in accordance with good practice guidelines in place at the time of the works.

Table 5-15 – Embedded Mitigation

Ref	Measure	Project phase	Responsible party
AS 1	Preconstruction planning • Preparation of a Detailed SMP (to be substantially based on the Outline SMP). • Review of relevant DCO documents and identification of soil data gap and soil mitigation commitments. • Soil survey planning if there is a soil data gap and the survey is required. • Provision of training to Site Environmental Manager or delegated agent from qualified Soil Scientist.	Pre-construction / Construction	Main Works Contractor(s)
AS 2	Set out required roles and responsibilities for the effective implementation of the soil management measures as follows: • Site Environmental Manager. • Soil Scientist. • Site Agent.	Construction	Main Works Contractor(s)
AS 3	Soil resources baseline establishment • Soil type map. • Thickness / depth and volume of topsoil and subsoil.	Construction	Main Works Contractor(s)
AS 4	Soil training - Soil Scientist will provide training as follows: • Identifying topsoil, subsoil, soil type, and soil plasticity assessment to relevant personnel involved in soil handling and management activities. • Toolbox talks.	Construction	Main Works Contractor(s)
AS 5	Site preparation and vegetation clearance • Vegetation clearance and removal of arisings in line with CEMP. • Layout of haul routes, compounds, stockpile areas and permanent work design. • Biosecurity measures to prevent soil contamination by invasive non-native species or animal bones.	Construction	Main Works Contractor(s)
AS 6	Soil stripping • Soils to be stripped according to the thickness of soil horizons and soil types with minimum mixing. • Soils to be stripped in the driest conditions possible with works stopped where necessary during wet ground conditions. • Prior to stripping, the soil shall be tested for plasticity. • All stripped soils will be logged, tracked and labelled. • Minimisation of dust and silt-laden runoff generation.	Construction	Main Works Contractor(s)
AS 7	Soil stockpiling • Stockpiles to be located in appropriate locations to avoid increased flood risk, watercourses and topographic depressions. • Soils to be stockpiled in designated stockpile area according to temporary work design. • Topsoil and subsoil to be stockpiled separately and clearly labelled. • Different types of topsoil and subsoil to be stockpiled separately and clearly labelled. • Soils to be stockpiled within the heights stated in Detailed SMP. • Soil movements and stockpile content to be recorded.	Construction	Main Works Contractor(s)
AS 8	Soil stockpile maintenance	Construction	Main Works Contractor(s)

Ref	Measure	Project phase	Responsible party
	- Stockpiles to be seeded with low maintenance grass and clover mix to minimise risk of soil erosion and reduce the spread of weeds if stockpiled for over six months. - Vegetation cover to be managed during the summer months to control the spread of weeds.		
	Stockpile Reconditioning Soils to be reconditioned before reinstatement where required to restore a structured, uncompacted and well-aerated soil profile.	Construction	Main Works Contractor(s)
AS 9	Soil Reinstatement - Site-won soils should be considered to use for backfill where backfill material is particularly unsuitable (e.g., high rock content). - The full volume of soils and the correct horizon thickness and sequence to be reinstated to ensure the reinstated soil is suitable for its intended end use. This will include reinstating soils to their pre-construction ALC grade where land is being returned to agricultural use. - Reinstated soils will be checked by qualified Soil Scientist to ensure that soils are restored correctly, and any required remediation implemented.	Construction	Main Works Contractor(s)
AS 10	Aftercare - Requirement for an aftercare period of up to 5 years (Ref 5.28) to ensure reinstated land returned to its previous quality and functionality, or the condition required for their end-use. - An Aftercare Management Plan will be produced by the Main Works Contractor(s).	Construction / Operation	Main Works Contractor(s)
AS 11	Monitoring Soil Scientist will undertake monitoring to protect the quality of the soils during the soil stripping, stockpiling and re-use / restoration works.	Construction	Main Works Contractor(s)
AS 12	Implementation of soil mitigation measures - The applicant will put in place robust procedures to make sure that the mitigation measures set out in the Detailed SMP are adopted during the construction of the Project. - The Main Works Contractor(s) will brief all operatives on the specific details within the Detailed SMP prior to the commencement of works.	Construction	Main Works Contractor(s)

5.7 Preliminary Assessment of Potential Impacts

- 5.7.1 This section presents the preliminary assessment of agricultural land, soils and agricultural land holdings based on the baseline data available to date for construction, operation and decommissioning phases.
- 5.7.2 The permanent loss of agricultural land will result from the installation of the AGIs and the Pump Facility. The excavated soils from the permanent land take will be re-used within the Project where practicable to minimise any requirement for off-site disposal. The footprint of AGIs and the Pump Facility is 22.2 hectares (ha) at the B14 design stage, of which 2.6 ha is ALC Grade 1 land, 6.5 ha is ALC Grade 2, and 13.1 ha is ALC Grade 3 land according to Volume 3 - Figure 5.2: Provisional Agricultural Land Classification Map.
- 5.7.3 Temporary loss and disturbance of agricultural land and associated soils will result from the creation of construction compounds, construction traffic routes and the construction working width for pipeline installation. According to Chapter 2: Project Description, the footprint of the temporary loss of agricultural land is approximately 483 ha.
- 5.7.4 The footprint of the permanent and temporary loss of agricultural land above is a reflection of the current design and will be refined as the design evolves and matures with the consideration of the statutory consultation, stakeholder feedback and the findings of ALC survey and the assessment of agriculture and soils.

Construction

- 5.7.5 The potential impacts on agricultural land of different ALC Grades and soils from different ALC Grades during the construction phase are provided in Table 5-16.
- 5.7.6 The assessment of the impacts on the permanent loss of agricultural land and on the permanent loss of soil function and soil volume was based on Provisional Agricultural Land Classification Grades. The Provisional ALC 3 Grade land was assumed to be ALC Grade 3a, the worst-case scenario.
- 5.7.7 The assessment of the potential impacts on agricultural land holdings from the permanent land take during the construction phase is not assessed in this chapter as the ALC survey reporting (particularly in relation to the ALC Grades of the permanent land take from AGIs and Pump Facility) and the collection of

agricultural land holding information is still in progress. Therefore, the assessment on these receptors will be set out in the ES.

- 5.7.8 It is considered that given the scale of the Project, the route-wide potential impacts on agricultural land and soils would likely be Significant.

Table 5-16 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Variable	Sensitivity of receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial / significance	Direct / indirect
Temporary loss of agricultural land (approximately 483 ha)	ALC Grades 1&2	Very High	Temporary loss of agricultural land associated with the pipeline installation	Minor	Construction	Large adverse / significant	Direct
	ALC Grade 3a	High		Minor	Construction	Moderate adverse / significant	Direct
	ALC Grade 3b	Medium		Minor	Construction	Slight adverse / not significant	Direct
	ALC Grade 4	Low		Minor	Construction	Neutral / not significant	Direct
Permanent loss of agricultural land (approximately 22.2ha)	ALC Grades 1&2	Very High	Permanent loss of agricultural land associated with the AGIs and Pump Facility	Moderate	Construction / operation	Moderate / significant	Direct
	ALC Grade 3 (assumed to be 3a)	High		Moderate	Construction / operation	Moderate / significant	Direct
	Biomass production	Very High	Temporary loss of agricultural land	Minor	Construction	Large adverse / significant	Direct

Resource / Receptor	Variable	Sensitivity of receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial / significance	Direct / indirect
Temporary loss of soil function and soil volume	(ALC Grades 1 & 2)		associated with the pipeline installation				
	Biomass production (ALC Grade 3a)	High		Minor	Construction	Moderate adverse / significant	Direct
	Soil function and volume (ALC Grade 3b)	Medium		Minor	Construction	Slight adverse / not significant	Direct
	Soil function and volume (ALC Grades 4 & 5)	Low		Minor	Construction	Neutral / not significant	Direct
Permanent loss of soil function and soil volume	ALC Grades 1&2	Very High	Loss of soil function and volume from agricultural production	Moderate	Construction	Moderate / significant	Direct
	ALC Grade 3 (assumed to be 3a)	High		Moderate	Construction	Moderate / significant	Direct
Temporary effects on agricultural land		Medium	Severance and disruption to	Minor	Construction	Slight adverse / not significant	Direct

Resource / Receptor	Variable	Sensitivity of receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial / significance	Direct / indirect
holdings - route wide			farming activities during construction phase -route wide				
Temporary effects on individual agricultural land holding	To be assessed in the ES		Severance and disruption to farming activities during construction phase		Construction		Direct

Operation

- 5.7.9 Agricultural land, soils and agricultural land holdings are scoped out in the operation phase as soils and agricultural land from temporary land take will be reinstated after the construction phase and the land will be returned to landowners for agricultural use. The area of the permanent land take for AGIs and the Pump Facility will have been out of agricultural use from the construction phase. Soils generated from the permanent land take will have been re-used sustainably.
- 5.7.10 Soil temperature increase resulting from the heat emission of the pipeline will be assessed and reported in the ES when sufficient data is available.

Table 5-17 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Soil temperature increase resulting from the heat emission of the pipeline	To be assessed in the ES	Impact on soil temperature, water, rooting and subsequently crop growth	To be assessed in the ES	Operation phase	To be assessed in the ES	Direct

Decommissioning

- 5.7.11 The potential impacts on agricultural land, soils and agricultural land holdings from the removal of AGIs and Pump Facility associated with the decommissioning phase is not assessed in this chapter. The assessment on these receptor variables will be undertaken later and reported in the ES.

Table 5-18 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Temporary effects on agricultural land holdings - route wide	Medium	Severance and disruption to farming activities during decommissioning phase - route wide	Minor	Decommissioning phase	Slight adverse / not significant	Direct
Reinstated agricultural land (approximately 22.2 ha) from AGIs and Pump Facility	Very high / High	The land of permanent land take from AGIs and Pump Facility returned for agricultural use after decommissioning (based on the assumption that the land will be restored to previous ALC Grades)	Moderate	Permanent after Decommissioning phase	Major positive / significant	Direct
Temporary effects on individual agricultural land holding	To be assessed in the ES when information collection is complete	Severance and disruption to farming activities during decommissioning phase		Decommissioning phase		Direct

5.8 Additional Mitigation and Enhancement Measures

- 5.8.1 No additional mitigation and enhancement measures have been identified for the construction, operation and decommissioning phases at the time of writing this chapter. Any additional mitigation and enhancement measures identified during the EIA process will be reported within the ES.

5.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 5.9.1 Table 5-19 below summarises the preliminary assessment of potential significant effects associated with the Project.

Table 5-19 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Variable	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Agricultural land from temporary loss	ALC Grades 1&2	Very High	Construction	Minor (for ALC Grades 1, 2, 3a, 3b and 4) due to temporary loss of agricultural land from the trenching work of the pipeline construction, compounds and haul roads, approximately 483 ha	Construction period and up to 5 years after the construction phase	Embedded mitigation measures as stated in Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation, Table 5-15 and Appendix 5.1: Outline Soil Management Plan	Large adverse / significant
	ALC Grade 3a	High					Moderate adverse / significant
	ALC Grade 3b	Medium					Slight adverse / not significant
	ALC Grade 4	Low					Neutral / not significant
Agricultural land from temporary loss	ALC Grades 1&2	Very High	Construction	Permanent loss of agricultural land associated with the AGIs and Pump Facility, approximately 22.2ha	Permanent, once the land is taken and construction starts	N/A	Moderate / significant
	ALC Grade 3	Very High					Moderate / significant
Soil function and soil volume from temporary land take	Biomass production (ALC Grades 1 & 2)	Very High	Construction	Minor (for the soils from ALC Grades 1, 2, 3a, 3b and 4) due to temporary disturbance to soils from the trenching work of the pipeline construction, compounds and haul roads from approximately 483 ha farmland	Construction period	Embedded mitigation measures as stated in Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation, Table 5-15 and Appendix 5.1: Outline Soil Management Plan	Large adverse / significant
	Biomass production (ALC Grade 3a)	High					Moderate adverse / significant
	Soil function and volume (ALC Grade 3b)	Medium					Slight adverse / not significant
	Soil function and volume (ALC Grades 4 & 5)	Low					Neutral / not significant
Soil function and soil volume from permanent land take	Biomass production (ALC Grades 1 & 2)	Very High	Construction	Loss of soil function and volume from agricultural production	Moderate	Soils to be reused and Appendix 5.1: Outline Soil Management Plan	Moderate / significant

Receptor / resource	Variable	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
	Biomass production (ALC Grade 3)	High			Moderate		Moderate / significant
Temporary effects on agricultural land holdings	route wide	Medium	Construction	Minor due to temporary severance and disruption to farming activities during construction phase -route wide	Construction period	Embedded mitigation measures as stated in Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation	Slight adverse / not significant
Reinstated agricultural land (approximately 22.2 ha) from AGIs and Pump Facility		Very high / High	Decommissioning	The land of permanent land take from AGIs and Pump Facility returned for agricultural use after decommissioning (based on the assumption that the land will be restored to previous ALC Grades)	Permanent after Decommissioning phase	Soil Management Plan	Major positive / significant
Soil temperature from the heat emission of the pipeline	To be assessed in ES	To be assessed in the ES	Operation	Impact on soil temperature, water, rooting and subsequently crop growth	To be assessed in the ES	To be assessed in the ES	To be assessed in the ES
Soil structure	To be assessed in ES	To be assessed in the ES	Construction	Damage to soil structure from soil handling	To be assessed in the ES	To be assessed in the ES	To be assessed in the ES
Temporary effects on individual agricultural land holding	To be assessed in the ES	To be assessed in ES	Construction / Decommissioning	Temporary severance and disruption to farming activities from construction and decommissioning activities	To be assessed in the ES	To be assessed in the ES	To be assessed in the ES

5.10 Next Steps

Design Development

- 5.10.1 The Project design will continue to be reviewed following the progress of the design to assess the potential impact and impact change in relation to agriculture and soils, e.g. the update of the draft Order Limits, trench dimension, trenching methodology and land take change. The final design will be reviewed, assessed and presented in the ES.

Engagement

- 5.10.2 Engagement with PINS, Natural England and Environment Agency has taken place and their scoping opinion has been addressed and considered in the preliminary assessment.
- 5.10.3 Engagement will continue throughout the EIA if further consultation is required.

Surveys

- 5.10.4 No further ALC surveys identified at this stage. There may be design changes which result in a requirement for further surveys which will be undertaken and reported in the ES.

Further Assessment

- 5.10.5 The impact on soil structure associated with temporary and permanent land take will be assessed and reported in the ES once the ALC report is complete and soil data is available.
- 5.10.6 Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation, Table 5-15 and Appendix 5.1: Outline Soil Management Plan may be updated according to the soil properties identified in the ALC report.
- 5.10.7 The impact on individual agricultural land holding during construction and decommissioning phases will be assessed and reported in the ES once the information collection of agricultural land holding is complete.
- 5.10.8 The impact on soils from the heat emission from the pipeline will be assessed and reported in the ES once the study of soil temperature and the soil temperature modelling is complete.

- 5.10.9 The preliminary assessment in this chapter may be updated and reported in the ES following the evolution of the design, the progress and completion of the baseline data collection and further consultation.

5.11 References

- Ref 5.1 Agricultural Land (Removal of Surface soil) Act (1953) Available at: [Agricultural Land \(Removal of Surface Soil\) Act 1953](#)
- Ref 5.2 Environmental Act. (2021) Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents>.
- Ref 5.3 Department for Energy Security & Net Zero (2024) Overarching National Policy Statement for Energy (EN-1). Available at: <https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1>
- Ref 5.4 Department for Energy Security & Net Zero (2024) National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) Available at: <https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf>.
- Ref 5.5 Ministry of Housing, Communities and Local Government (2025) The National Planning Policy Framework (NPPF) Available at: https://assets.publishing.service.gov.uk/media/67aaf8f3b41f783cca46251/NPPF_December_2024.pdf.
- Ref 5.6 North Yorkshire Council (2024) Selby Local Plan, Revised Publication 2024.
- Ref 5.7 East Riding of Yorkshire Council (2023) East Riding Local Plan Strategy Document 2012-2019.
- Ref 5.8 North Lincolnshire Council (2011) North Lincolnshire Local Development Framework Core Strategy.
- Ref 5.9 North East Lincolnshire Council (2018) Local Plan 2013 to 2032 (Adopted 2018)
- Ref 5.10 Defra (2009) Safeguarding our Soils, A strategy for England.
- Ref 5.11 Natural England (2021). Guide to assessing development proposals on agricultural land- GOV-UK Available at: <https://www.gov.uk/government/publications/agricultural-land-assess-proposals-for-development/guide-to-assessing-development-proposals-on-agricultural-land>.
- Ref 5.12 National Highways (2019) Design Manual for Roads and Bridges (DMRB) LA109: Geology and soils
- Ref 5.13 IEMA (2022) A New Perspective on Land and Soil in Environmental Impact Assessment.

- Ref 5.14 National Highways (2020) Design Manual for Roads and Bridges (DMRB) LA112: Population and human health.
- Ref 5.15 BSSS (2022) Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction.
- Ref 5.16 Defra (2009) Construction Code of Practice for the Sustainable Re-use of Soils on Construction Sites.
- Ref 5.17 Institute of Quarrying (2024) Good Practice Guide for Handling Soils in Mineral Workings.
- Ref 5.18 British Standards Institution (2015) BS 3882:2015 Specification for topsoil. London: British Standards Institution.
- Ref 5.19 Ministry of Agriculture Fisheries and Food (1998) Agriculture land classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.
- Ref 5.20 Hodgson, J. M (ed) (2022) The Soil Survey Handbook. Soil Survey Technical Monograph No.5, Cranfield.
- Ref 5.21 Google LLC (2024) Google Earth Pro 7.3.6.9796.
- Ref 5.22 UK Centre for Ecology & Hydrology (2024) Land Cover Map 2024 (10m classified pixels, GB) Available at:
<https://www.data.gov.uk/dataset/11b7c1de-6443-4948-afe3-3319421092dd/land-cover-map-2024-10m-classified-pixels-gb>.
- Ref 5.23 Cranfield University (2024) National Soil Map of England and Wales – NATMAP.
- Ref 5.24 Defra (2024) Magic Map Application.
- Ref 5.25 Natural England (2017) Likelihood of Best and Most Versatile (BMV) Agricultural Land - Strategic scale maps.
- Ref 5.26 Hannam et al., (2025) Changes in land capability for agriculture under climate change in Wales, Science of The Total Environment, Volume 987, July 2025.
- Ref 5.27 HM Government (2018) A Green Future: Our 25 Year Plan to Improve the Environment.
- Ref 5.28 Natural England (2022) [Planning and aftercare advice for reclaiming land to agricultural use - GOV.UK](#).

6 Air Quality

6.1 Introduction

- 6.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Air Quality. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 6.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Air Quality effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 6.1.3 The following air quality effects are considered within this chapter:
- Dust generated during the construction and decommissioning phases.
 - Vehicle emissions during the construction, operation and maintenance and decommissioning phases.
 - Emissions from Non-Road Mobile Machinery (NRMM) (onsite plant) during the construction and decommissioning phases.
 - Back-up generator emissions during the operation and maintenance phase.
- 6.1.4 This chapter should be read in conjunction with:
- Chapter 4: EIA Methodology for broader methodology applied.
 - Chapter 7: Ecology and Biodiversity relevant due to the potential for changes in air quality, including nitrogen deposition, from construction traffic and plant emissions.
 - Chapter 14: Socio-economics, Recreation and Tourism, for the potential effects of pollutants on recreation and tourism sites.
 - Chapter 15: Human Health and Wellbeing for interactions on human health and wellbeing.
 - Chapter 16: Traffic and Transport for interactions with traffic and transport.
- 6.1.5 This chapter is supported by the following figures:
- Volume 3 – Figure 6.1 – Construction Dust Assessment Study Area.
 - Volume 3 – Figure 6.2 – Non-Road Mobile Machinery Emissions Assessment Study Area.

- Volume 3 – Figure 6.3 – Back Up Generator Emissions Assessment Study Area
- Volume 3 – Figure 6.4 – Air Quality Baseline.

6.1.6 This chapter is supported by the following appendices:

- Volume 4 – Appendix 6.1: Construction Dust Assessment.
- Volume 4 – Appendix 6.2: Local Authority Monitoring Data.

6.2 Legislation, Policy and Guidance

Legislation

6.2.1 Legislation relevant to Air Quality is detailed in Table 6-1.

Table 6-1 – Summary of Legislation relevant to Air Quality

Legislation	How it is considered within this PEIR
Air Quality Standards Regulations 2010 (Ref 6.1)	These regulations implemented EU Directive (2008/50/EC) (Ref 6.2) on ambient air quality and cleaner air for Europe and remain in force in domestic law following the UK's withdrawal from the EU pursuant to s.2 of the European Union (Withdrawal) Act 2018. EU Directive 2008/50/EC (Ref 6.2) on ambient air quality and cleaner air for Europe set legally binding limits for concentrations of specific air pollutants. It merged, consolidated and replaced the majority of previous EU air quality legislation, and incorporated the Fourth Daughter Directive. The air quality pollutants considered in this assessment are detailed in Table 6-5.
The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (Ref 6.3)	These regulations made amendments to the Air Quality Standards Regulations 2010 (Ref 6.1) to reflect the UK's departure from the EU.
Air Quality (England) Regulations 2000 (Ref 6.4) as amended in 2002 (Ref 6.5)	The regulations set national air quality objective levels for local authorities to meet in England. The Air Quality Strategy (AQS) objectives for pollutants considered within this assessment are shown in Table 6-5.
The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (Ref 6.6)	The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amended the particulate matter less than 2.5 microns in diameter (PM _{2.5}) Limit Value from 25µg/m ³ (within the Air Quality Standards Regulations 2010) to 20µg/m ³ in line with the requirement of the EU Directive (2008/50/EC) (Ref 6.2) during the transition of the UK's withdrawal from the European Union. The PM _{2.5} objective considered for this assessment is shown in Table 6-5.
Environment Act 1995 (Ref 6.7)	This requires the UK Government to produce a national Air Quality Strategy, which contains standards, objectives and measures for improving ambient air quality. Where

Legislation	How it is considered within this PEIR
	the air quality standards are not being met, a local authority is required to designate an Air Quality Management Area (AQMA). The AQMAs identified within close proximity to the Project are detailed in the Baseline section of this PEIR chapter.
Environment Act 2021 (Ref 6.8)	The Environment Act 2021 (Ref 6.8) has two main functions: • To give a legal framework for environmental governance in the UK; and • To bring in measures for the improvement of the environment in relation to waste, resource efficiency, air quality, water, nature and biodiversity, and conservation. The majority of the Act does not make any immediate changes for organisations other than regulators. Legislative requirements relevant to air quality include the requirement for the Secretary of State to set targets for PM_{2.5}. The PM_{2.5} objective considered for this assessment is shown in Table 6-5.
Environmental Protection Act 1990 (Ref 6.9)	Part III of the Environmental Protection Act 1990 provides legislation around statutory nuisance, which applies to dust. A preliminary construction dust assessment has been undertaken for the PEIR and is detailed in Appendix 6.1: Construction Dust Assessment.
The Environmental Targets (Fine Particulate Matter) England Regulations 2023 (Ref 6.10)	This sets the following targets for particulate matter less than 2.5 µm in diameter (PM_{2.5}): • Annual Mean Concentration Target ('concentration target') – a target of 10 micrograms per cubic metre (µg/m³) to be met across England by 2040. • Population Exposure Reduction Target ('exposure reduction target') – a 35% reduction in population exposure by 2040 (compared to a base year of 2018). These targets will be considered in the Air Quality assessment of construction vehicle emissions and reported in the ES.

Legislation	How it is considered within this PEIR
The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018 (Ref 6.11)	This sets out gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for NRMM. These have been considered for embedded mitigation measures regarding NRMM and potential construction phase impacts.

Policy

National Planning Policy

6.2.2 National Planning Policy relevant to Air Quality is detailed in Table 6-2.

Table 6-2 – Summary of National Planning Policy relevant to Air Quality

Planning Policy Reference	Policy Context	How it is considered within this PEIR
EN-1 (Ref 6.12)		
5.2.1	‘Infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emissions to air which could lead to adverse impacts on health, on protected species and habitats, or on the wider countryside and species.’	The Air Quality assessment has considered the effects and resulting impacts associated with the construction, operation and decommissioning phases as set out in Section 6.4 and Section 6.7.
5.2.3	‘For many air pollutants there is not a threshold below which there is no health impact so it is important that energy infrastructure schemes consider not just how a scheme may impact statutory air quality limits, objectives or targets but also measures to mitigate all emissions in order to minimise human exposure to air pollution, especially for those who are more susceptible to the impacts of poor air quality.’	The Air Quality assessment has considered whether the Project is likely to lead to a breach of the air quality thresholds in accordance with the relevant legislation and guidance. Embedded mitigation measures are detailed in Section 6.6.
5.2.4	‘A particular effect of air emissions from some energy infrastructure may be eutrophication, which is the excessive enrichment of nutrients in the environment. Eutrophication from air pollution results mainly from emissions of NO _x and ammonia.’	Potential air quality impacts from emissions of nitrogen oxides (NO _x) and ammonia will be assessed and reported in the ES, where required, upon screening of relevant data to determine their effect on human and ecological receptors.
5.2.5	‘Emissions from combustion plants are generally released through exhaust stacks. Design of exhaust stacks, particularly height, is the primary driver for the delivery of optimal dispersion of emissions and is often determined by statutory requirements. The optimal stack height is dependent upon the local terrain and meteorological conditions, in combination with the emission characteristics of the plant.’	A preliminary assessment of combustion plant and NRMM emissions has been undertaken as set out in Section 6.4 and Section 6.7.
5.2.8	‘Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the ES.’	A preliminary assessment of air quality impacts has been undertaken as set out in Section 6.4 and Section 6.7.
5.2.9	‘The ES should describe: - Existing air quality concentrations and the relative change in air quality from existing levels; - Any significant air quality effects, mitigation action taken and any residual effects, distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project; - The predicted absolute emissions, concentration change and absolute concentrations as a result of the proposed project, after mitigation methods have been applied; and - Any potential eutrophication impacts.’	Baseline air quality concentrations have been considered in Section 6.5. Should screening of traffic data for any of the Project stages indicate detailed assessment is required, then dispersion modelling will be undertaken as part of the Air Quality assessment to determine the change in pollutant concentrations as a result of the Project at relevant human and ecological receptor locations as detailed in Section 6.4.
5.2.10	‘Applicants should consider the Environment Targets (Fine Particulate Matter) (England) Regulations 2022 [<i>sic</i>] and associated Defra guidance.’	All the relevant legislation and guidance has been considered in the Air Quality assessment, as detailed in Table 6-1 and Section 6.2.4.
5.2.13	‘The Secretary of State should consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the	A preliminary construction dust assessment has been undertaken to identify appropriate mitigation measures, detailed in Volume 4 – Appendix 6.1: Construction Dust

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	project application. A construction management plan may help codify mitigation at this stage.'	Assessment. These measures have been incorporated in the draft Construction Environmental Management Plan (CEMP). This will be reviewed and reported in the ES.
5.7.5	'The applicant should assess the potential for insect infestation and emissions of odour, dust, steam, smoke, and artificial light to have a detrimental impact on amenity, as part of the ES.'	An Air Quality assessment has been undertaken to determine where the Project is likely to have adverse impacts on air quality, including dust emissions, as detailed in Section 6.4. Embedded mitigation measures are detailed in Section 6.6.
NPPF (Ref 6.13)		
Paragraph 192	'Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.'	The Air Quality assessment has been undertaken in accordance with relevant legislation, guidance and planning policies, as outlined in Section 6.2.

Local Planning Policy

6.2.3 Local Planning Policies relevant to Air Quality are detailed in Table 6-3.

Table 6-3 – Summary of Local Planning Policy relevant to Air Quality

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
East Riding of Yorkshire Local Plan (Ref 6.14)	Policy ENV6: Managing environmental hazards	‘Environmental hazards, such as flood risk, coastal change, groundwater pollution and other forms of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment.’	Mitigation measures have been proposed where necessary to ensure that the overall air quality impacts of the Project do not result in unacceptable consequences.
North Lincolnshire Local Development Framework Core Strategy (Ref 6.15)	Spatial Objective 7: Efficient Use and Management of Resources	‘To ensure the efficient use of resources, minimising pollution, maintaining and improving air and employing sustainable building practices in new development.’	Mitigation measures have been proposed where necessary to ensure that pollution is minimised and air quality is maintained or improved.
North East Lincolnshire Local Plan 2013 to 2032 (Ref 6.16)	Policy 31: Renewable and low carbon infrastructure	‘Proposals for renewable and low carbon energy generating systems will be supported where any significant adverse impacts are satisfactorily minimised and the residual harm is outweighed by the public benefits of the proposal. Developments and their associated infrastructure will be assessed on their merits and subject to the following impact considerations, taking account of individual and cumulative effects: local amenity, including noise, air quality, traffic, vibration, dust and visual impact.’	A preliminary assessment of air quality has been undertaken. Mitigation measures have been proposed where necessary to minimise potential adverse effects.

Guidance

6.2.4 The Air Quality assessment has been carried out in accordance with the following guidance:

- The Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (Ref 6.17).
- The Environmental Protection UK (EPUK) and IAQM Guidance on Land Use Planning and Development Control: Planning for Air Quality (Ref 6.18).
- Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management Technical Guidance (LAQM.TG (22)) (Ref 6.19).
- The IAQM Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Ref 6.20).
- National Highways Design Manual for Roads and Bridges (DMRB) LA105 Air Quality (Ref 6.21).

6.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

6.3.1 A summary of relevant parts of the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined below.

Table 6-4 – Summary of Scoping Opinion relevant to Air Quality

Section Reference	Matter	Comments	Response
ID 3.2.1	Carbon Dioxide	‘The Scoping Report notes that venting activities would release small amounts of carbon dioxide and is considered a climate issue, rather than air quality. The Inspectorate agrees this matter can be scoped out of the air quality assessment on the basis it is assessed in the Climate Change, Adaptation and Resilience chapter of the ES.’	No response required.
ID 3.2.3	PM _{2.5}	‘The applicant's attention is drawn to the Defra advice 'PM_{2.5} Targets: Interim Planning Guidance'. The ES should explain how key sources of air pollution within the proposed development have been identified and how action has been taken to minimise emissions of PM_{2.5} or its precursors.’	Key sources of air pollution have been identified, and mitigation measures proposed where required. PM _{2.5} has been considered in the assessment.
Hull City Council	Hull City Council AQMA	‘The ES should identify the AQMA declared in Hull City Council which is in proximity to the Salt End Spur Line. The ES should assess any effects on the AQMA, where significant effects are likely.’	The preliminary assessment has identified all current AQMAs, as detailed in Section 6.5. The PEIR and ES will assess any effects on the AQMAs, where required.
Natural England Response Appendix A	Hull City Council AQMA	‘There is a designated Air Quality Management Area (AQMA) within the city of Hull, and given that part of the proposed cable route would be located within close proximity to the administrative area of Hull City Council, and that both strategic and local road networks in the city could be affected by increased vehicular traffic / HGV movements during the construction period, there is potentially scope for the proposed development to generate emissions which could impact upon air quality both within and without the AQMA. Consequently, it is recommended that consultation be undertaken with Environmental Health officers at Hull City Council.’	The preliminary assessment has identified all current AQMAs, as detailed in Section 6.5. The PEIR and ES will assess any effects on the AQMAs, where required. Consultation will be undertaken with the Environmental Health officers at Hull City Council and reported in the ES, once the traffic data has been finalised.
North Lincolnshire Council Response	Designated sites	‘The planning system plays a key role in determining the location of developments which may give rise to pollution, either directly, or from traffic generation, and hence planning decisions can have a significant impact on the quality of air, water and land. The ES should take account of the risks of air pollution and how these can be managed or reduced. This should include taking account of any strategic solutions or SNAPs, which may be being developed or implemented to mitigate the impacts of air quality.’ [...] ‘Designated sites within 200m of a road which will experience a significant increase in traffic movements should be assessed for impacts	The assessment will consider all phases of the Project (construction, operation / maintenance, and decommissioning) in terms of emissions to air on both human and ecological receptors. Should there be designated sites within 200m of a road experiencing a significant increase in traffic as a result of the Project, effects on the designated sites will be assessed and reported in the ES. This will include consideration of ammonia. Construction dust will be considered, and designated sites within 200m of a dust source will be screened in. Mitigation measures will be proposed, where required, and outlined in the CEMP.

Section Reference	Matter	Comments	Response
		due to air pollution from traffic. When undertaking an assessment of the potential impacts during the construction phase of the development there will need to be clarification provided on which roads will be used to access the development site, and the number of predicted vehicle movements. Natural England has produced guidance for assessing the impacts of air pollution due to traffic. Ammonia emissions from road traffic could make a significant difference to nitrogen deposition close to roads. As traffic composition transitions toward more petrol and electric cars (i.e., fewer diesel cars on the road) – catalytic converters may aid in reducing NO_x emissions but result in increased ammonia emissions – therefore consideration of the potential for impacts is needed. There are currently two models which can be used to calculate the ammonia concentration and contribution to total N deposition from road sources. One of these models is publicly available and called CREAM, and there is another produced by National Highways. Potential impacts which may arise due to dust and other pollution incidents during construction should also be considered. Designated sites within 200m of a dust source should be screened in for impacts. Suitable mitigation for these impacts could be outlined within a CEMP.’	
North Yorkshire Council Response	Construction Phase, Operational Phase and Decommissioning Phase Proposals.	‘The Air Quality chapter of the Scoping Report has considered the construction phase, operational phase and decommissioning phase of the development. Construction Phase. The dust, non-road mobile machinery (NRMM) and vehicle emissions are proposed to be scoped into the next stages of assessment. Operational Phase. The report identifies that the vehicles emission in the operational phase of the development are unlikely to exceed guidance levels so will be scoped out of further assessment (though this will be confirmed once traffic figures are confirmed). Vehicles movements are likely only to consist of repair and routine maintenance visits a couple of times a year. Decommissioning Phase. As above in the construction phase, the dust, NRMM and vehicle emissions are proposed to be scoped into the next stage of assessment. We are in agreement with the above proposals.	No response required.

Section Reference	Matter	Comments	Response
		Dust emissions (that may give rise to a nuisance) has been considered and will be assessed in accordance with the methodology outlined in the IAQM construction dust guidance.'	
UK Health Security Agency		'Our position is that pollutants associated with road traffic or combustion, particularly particulate matter, and oxides of nitrogen, are non-threshold; i.e., an exposed population is likely to be subject to potential harm at any level and that reducing public exposure to non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards will have potential public health benefits. We support approaches which minimise or mitigate public exposure to non-threshold air pollutants, address inequalities (in exposure) and maximise co-benefits (such as physical exercise). We encourage their consideration during development design, environmental and health impact assessment, and development consent.'	Noted. Mitigation measures have been proposed, where required.

Summary of Engagement

- 6.3.2 No air quality specific engagement has been undertaken to date, other than the comments received and addressed from the Scoping Opinion as detailed in Table 6-4. Consultation will be undertaken with local authorities upon receipt and screening of the construction traffic data, prior to commencement of the ES.

6.4 Assessment Methodology

Baseline Data

Study Area

Construction Dust Assessment

- 6.4.1 The current draft Order Limits, detailed in Chapter 2: Project Description, have been used to define the construction dust Study Area for the PEIR, along with the Project's proposed construction routes, detailed in Chapter 16: Traffic and Transport. In accordance with the IAQM construction dust guidance, the Study Area for construction phase dust is:
- 250 m from the Project Boundary for human receptors (based on the worst-case assumption that construction activities would occur at the Project boundary) and up to 50 m for ecological receptors.
 - 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrances.
- 6.4.2 The construction dust Study Area is presented in Figure 6.1 – Construction Dust Assessment Study Area.

Vehicle Emissions Assessment

- 6.4.3 In accordance with the DMRB LA105 guidance, the Study Area for vehicle emissions comprises an area within 200m of the Affected Road Network (ARN). For this assessment, the ARN is defined as any roads which exceed any of the EPUK & IAQM development control guidance traffic screening criteria. The screening criteria provide the thresholds above which an assessment may be necessary. There are thresholds for the daily flows of Light Duty Vehicles (LDVs) and Heavy-Duty Vehicles (3.5t) (HDVs), which vary depending on whether an AQMA is present or not. Where the criteria are met, an assessment is generally considered necessary to determine the concentrations of pollutants

in ambient air at human or ecological receptors adjacent to the roads that meet the criteria. The IAQM screening criteria are as follows:

- A change in LDV flows of more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA, or more than 500 AADT elsewhere.
- A change in HDV flows of more than 25 AADT within or adjacent to an AQMA, or more than 100 AADT elsewhere.
- Where a road is realigned by 5m or more and is within an AQMA.
- Where a junction is added or removed close to existing receptors.

6.4.4 The construction phase AADT data was not finalised for PEIR to determine the ARN, however screening of the preliminary traffic data indicates there would be a total of 356 AADT HDV movements during the peak construction year (currently forecast to be 2030). Chapter 16: Traffic and Transport provides further details regarding the construction vehicle flows and proposed construction routes. Once these construction vehicle movements have been assigned to the road network in the finalised dataset, the ARN will be determined and reported in the ES based on the IAQM screening criteria described above.

NRMM Emissions Assessment

6.4.5 No specific guidance exists on the definition for a Study Area for NRMM point sources due to the large variation in potential impact from different types and specifications of NRMM. For the purposes of this assessment, identification of any receptors within 200 m of the draft Order Limits is considered appropriate given the size and temporary nature of the operations. Beyond this distance, it is judged that the effect of any emissions on local air quality would not be significant.

6.4.6 The Study Area for NRMM emissions assessment is presented in Figure 6.2 – Non-Road Mobile Machinery Emissions Assessment Study Area.

Back-Up Generator Emissions Assessment

6.4.7 As with NRMM, no specific guidance exists on the definition for a Study Area for generators. For the purposes of this assessment a Study Area of 200 m radius from the Pump Facility is considered appropriate. Beyond this distance it is judged that the effect of any emissions on local air quality would not be significant.

- 6.4.8 As demonstrated in Figure 6.3 – Back Up Generator Emissions Assessment Study Area, there are no sensitive receptors identified within 200 m of the Pump Facility, therefore generator emissions have been scoped out for further assessment. Dimlington Cliff SSSI is the only designated site within 200 m of the Pump Facility, however, has been screened out as a sensitive ecological site due to being designated for its geological nature.

Baseline Data Collection

Desk Study Sources

- 6.4.9 Baseline conditions of the Project were established during a desk study using the following sources:
- Defra UK Air website – to establish predicted background concentrations for nitrogen dioxide (NO₂), particulate matter less than 10 microns in diameter (PM₁₀) and PM_{2.5}.
 - East Riding of Yorkshire Council website and Air Quality Annual Status Reports (ASR) – to determine existing AQMAs and local air quality monitoring results.
 - North Yorkshire Council – to determine existing AQMAs and local air quality monitoring results.
 - Hull City Council – to determine existing AQMAs and local air quality monitoring results.
 - North Lincolnshire Council – to determine existing AQMAs and local air quality monitoring results.
 - North East Lincolnshire Council – to determine existing AQMAs and local air quality monitoring results.
 - Defra's MAGIC website – to identify ecological sites within the air quality Study Areas.

Site Visits and Surveys

- 6.4.10 There is sufficient baseline data to inform the assessment, therefore no Project specific air quality monitoring has been undertaken.

Impact Assessment Methodology

Sensitivity

Construction Dust Assessment

- 6.4.11 The sensitivity of the area to dust impacts, can be defined as low, medium or high sensitivity, in accordance with IAQM construction dust guidance.

- 6.4.12 The influencing factors to define receptor sensitivity to dust impacts are as follows:
- High – where human receptors expected to be present continuously for extended periods of time e.g. residential properties, hospitals, schools and care homes. This would also include internationally or nationally designated ecological sites.
 - Medium – where users would expect to enjoy a reasonable level of amenity and value could be diminished by dust soiling e.g. parks and places of work. This would also include nationally designated ecological sites.
 - Low – where enjoyment of amenity would not reasonably be expected and exposure would be for limited periods e.g. footpaths, shopping streets and car parks. This would include locally designated ecological sites.
- 6.4.13 The IAQM construction dust guidance defines a human receptor as ‘any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to particulate matter over a time period relevant to the air quality objectives, as defined in the Government’s technical guidance for Local Air Quality Management. In terms of annoyance effects, this will most commonly relate to dwellings but may also refer to other premises such as buildings housing cultural heritage collections (e.g. museums and galleries), vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations (e.g. salad or soft-fruit production)’.
- 6.4.14 An ecological receptor is defined as ‘any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (e.g. on foraging habitats)’.

Vehicle Emissions Assessment

- 6.4.15 The guidance LAQM (TG22) defines a sensitive receptor as a location representative of human (or ecological) exposure to a pollutant, over a time period relevant to the objective that is being assessed against, where the AQS objectives are considered to apply, as detailed in Table 6-6. The AQS objectives for pollutants considered within this assessment are shown in Table 6-5.

Table 6-5 – AQS Objectives Considered within this Assessment

Pollutant	AQS Objective Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM ₁₀	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year
PM _{2.5}	20	Annual mean

Table 6-6 – Examples of Locations where AQS Objectives apply

Averaging Period	Objectives should apply at:	Objectives should not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24-hour mean	All locations where the annual mean objective would apply, together with hotels and gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1-hour mean	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

- 6.4.16 For ecological sites sensitive to air pollutants the change in NO_x and nitrogen deposition would be calculated at those sites which are screened into the vehicle emissions assessment Study Area (within 200 m of the affected road network). This would be done by modelling a series of receptors in a transect (spaced at 10 m intervals) extending into the ecological site from the closest point between the ecological site and the nearest affected road (out to a distance of 200 m from the road).

Magnitude of effect

Construction Dust Assessment

- 6.4.17 The scale and nature of the works determines the magnitude of dust emissions arising as small, medium or large. IAQM construction dust guidance provides the following criteria to define the potential magnitude of dust emission:
- Small – demolition volume under 12,000 m³, demolition activities less than 6m above ground level, total site area less than 18,000 m², soil type with large grain size, construction material with low potential for dust release, less than 20 outward HDV trips per day, unpaved road length less than 50 m.
 - Medium – demolition volume 12,000 m³ – 75,000 m³, demolition activities 6 m – 12 m above ground level, total site area 18,000 m² – 110,000 m², moderately dusty soil type, potentially dusty construction material, 20 to 50 outward HDV trips per day, unpaved road length 50 – 100 m.
 - Large – demolition volume greater than 75,000 m³, on-site crushing and screening demolition, demolition activities greater than 12 m above ground level, total site area greater than 110,000 m², more than 10 heavy earth moving vehicles active at any one time, on site concrete batching, sandblasting, more than 50 outward HDV trips per day, unpaved road length greater than 100 m.

Vehicle Emissions Assessment

- 6.4.18 The requirement for emissions from vehicles to be quantitatively assessed will be determined and reported in the ES by comparing the traffic impacts of the Project against the EPUK & IAQM traffic screening criteria:
- A change in LDV flows of more than 100 AADT within or adjacent to an AQMA, or more than 500 AADT elsewhere.
 - A change in HDV flows of more than 25 AADT within or adjacent to an AQMA, or more than 100 AADT elsewhere.

- Where a road is realigned by 5m or more and is within an AQMA.
- Where a junction is added or removed close to existing receptors.

6.4.19 Should screening of the traffic data indicate that any of the IAQM traffic criteria are met, then potential impacts of vehicle emissions at sensitive receptors will be assessed using Atmospheric Dispersion Modelling Software (ADMS) to calculate the Project related change in NO₂ and particulate matter (PM) concentrations at receptors.

6.4.20 Should vehicle emissions modelling be required, the magnitude of change in air quality will be calculated based on IAQM development control guidance according to the percentage change in concentration between the 'without Project' and 'with Project' scenarios relative to the relevant AQS objectives. When this magnitude of change is used together with the total concentration predicted at each receptor (in relation to the AQS objective) it allows the calculation of an impact descriptor (negligible, slight, moderate or substantial) as shown in Table 6-7.

Table 6-7 – EPUK and IAQM Impact Descriptors for Individual Receptors

Long-term average concentration at receptor in assessment year	Percentage change in concentration relative to 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

* AQAL may be an air quality objective or EU limit or target

Significance

Construction Dust Assessment

6.4.21 The IAQM construction dust guidance categorises the unmitigated risk of dust impacts on human health and amenity (rather than ascribe a significance of effect) as a means of identifying the level of dust emissions mitigation required to ensure that residual effects are 'not significant'. The risk of dust impact

categories are presented in Volume 4 – Appendix 6.1: Construction Dust Assessment. A higher dust risk rating requires more stringent mitigation measures in order to limit residual effects.

Vehicle Emissions Assessment

- 6.4.22 The EPUK & IAQM development control guidance notes that the impact descriptors in Table 6-7 are for individual receptors only and the overall significance of effect should be determined using professional judgement, taking into account the degree of impact and factors such as:
- The existing and future air quality in the absence of the Project.
 - The extent of current and future population's exposure to the impact.
 - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.
- 6.4.23 Significance of emissions effects for ecological receptors will be assessed in accordance with the Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites. The guidance states that 'the 1% threshold has become widely used throughout the Air Quality assessment profession to define a reasonable quantum of long-term pollution which is not likely to be discernible from fluctuations in background / measurements'. As such, if the long-term Process Contribution (PC) is less than 1% of the critical level (30 µg/m³), then the effect of emissions is considered to be not significant. Where the 1% threshold is exceeded, this does not necessarily mean that a significant effect is caused, it requires further assessment work to evidence a conclusion as to whether the change in air quality is likely to cause a significant effect on the ecological receptor.

NRMM Emissions Assessment

- 6.4.24 An assessment of the air quality impacts from NRMM emissions during construction will be undertaken and reported in the ES once further details about the proposed construction is available. Should dispersion modelling of NRMM emissions be required then the sensitivity of receptors, magnitude of impact and assessment of significance would be determined using the same approach as described above for the assessment of vehicle emissions.

Assumptions and Limitations

6.4.25 The methodology for Air Quality assessment has considered the following assumptions and limitations:

- This preliminary assessment was based on baseline and Project design information available at the time of writing this chapter. A full assessment will be undertaken as part of the EIA, with the assessment to be developed and refined following statutory consultation. As additional information becomes available, the final assessment will be updated and presented within the ES.
- It is assumed that all construction activities other than construction traffic will take place within the draft Order Limits.
- The peak construction year of the Project, based on construction vehicle traffic, is 2030.
- The construction information used for the assessment of construction dust is based on professional judgement and is subject to change as the EIA process progresses. Any changes that could affect conclusion of the construction dust assessment will be stated and reassessed in the ES. However, it is anticipated that any changes to proposed construction activities are not likely to change the conclusion of the construction dust assessment.
- All ecological sites identified within 250 m of the draft Order Limits have been assumed to be high risk for the purposes of the preliminary construction dust assessment. Ecological sites will be reviewed, re-assessed and reported in the ES upon determining the final construction dust Study Area based on haul routes not confirmed in the PEIR.
- There was limited detail available for the proposed NRMM at this stage, therefore detailed assessment has not been possible and will be considered in the ES.
- Where the Project designs and details are either not yet known or incomplete at this stage, either assumptions have been made based on professional judgment, or, in the event that it is not possible to make any assumptions, no attempt at a full assessment has been made. This assessment is an iterative process and will be both expanded and made more specific as survey data is collected, analysed and reported on, and designs are further developed. This process will be carried out in conjunction with relevant consultees and third parties as necessary to achieve the most robust outcome.
- The traffic impacts of the operational phase and the decommissioning phase are expected to be lower than the construction phase. Operational phase vehicle flows are anticipated to be minimal for maintenance

purposes. Future year vehicle emissions and background pollutant concentrations are predicted to be lower than the construction phase. Therefore, it is assumed that the construction phase vehicle emissions assessment will represent a worst-case scenario.

- There is limited detail regarding decommissioning activities. Potential effects on air quality associated with dust generated during the decommissioning phase are considered to be less than those risks identified during the construction phase. As such, the assessment undertaken for construction phase dust effects is considered applicable in relation to decommissioning.

6.5 Baseline Conditions

Existing Baseline

- 6.5.1 The local authorities covering the anticipated air quality Study Areas have undertaken review and assessment of air quality within their area of jurisdiction.
- 6.5.2 North Yorkshire Council has declared eight AQMA. The closest AQMA to the Project is AQMA No.1 in Selby which was declared for exceedance of the annual mean NO₂ AQS objective. This AQMA encompasses a section of New Street and a number of properties flanking the road between Selby Abbey and the junction with Ousegate. This AQMA is approximately 6 km north-west of the Project draft Order Limits.
- 6.5.3 North Lincolnshire Council has declared one AQMA in Scunthorpe Town which was declared for exceedance of the 24-hour mean PM₁₀ AQS objective. This AQMA encompasses the integrated steelworks site and a number of properties to the east of Scunthorpe. This AQMA is approximately 3 km south of the Project draft Order Limits.
- 6.5.4 Kingston Upon Hull City Council has declared one AQMA for exceedances of the annual mean NO₂ AQS objective. This AQMA is an area of the city centre bordered to the west by Coltman St, Hessle Rd and Strickland St and to the north by Anlaby Rd, Carr Ln, Whitefriargate, Scale Ln and Silver St and to the east by the River Hull and the south by the River Humber. The AQMA is approximately 3.5 km north of the Project draft Order Limits.
- 6.5.5 East Riding of Yorkshire Council and North East Lincolnshire Council currently do not have any declared AQMA. Grimsby AQMA, declared by North East Lincolnshire Council for exceedance of the annual mean NO₂ AQS objective was revoked in May 2024.

- 6.5.6 Local authority monitoring data is reported in each local authority's ASR and is presented in Volume 4 – Appendix 6.2: Local Authority Air Quality Monitoring Data. For East Riding of Yorkshire Council, North East Lincolnshire Council, North Lincolnshire Council and North Yorkshire Council the most recent year of monitoring data available at the time of this assessment was 2023. For Kingston upon Hull City Council the most recent year of monitoring data available was for 2022. No exceedances of the AQS objectives for NO₂, PM₁₀ or PM_{2.5} were reported in 2022 or 2023 by any of the local authorities.
- 6.5.7 Figure 6.4 – Air Quality Baseline displays the AQMAs and monitoring locations within close proximity to the draft Order Limits.
- 6.5.8 A review of background pollutant concentrations across the Project area has been carried out using Defra predicted annual mean background maps provided in 1 km x 1 km grid squares. Table 6-8 summarises the 2025 background pollutant concentrations across the Project area. Consistent with the local authority monitoring data, the background pollution maps suggest that existing air quality is likely to be within air quality objectives across the Project area.

Table 6-8 – Summary of Defra 2025 background NO₂, PM₁₀ and PM_{2.5} concentrations for the Project

Pollutant	2025 background pollutant concentrations (µg/m ³)		AQS Objective (µg/m ³)
	Maximum	Average	
NO ₂	17.5	6.7	40
PM ₁₀	16.0	13.1	40
PM _{2.5}	7.6	5.8	20

- 6.5.9 The predicted background concentrations presented in Table 6-8 are well below the relevant AQS objectives for each pollutant. The 2025 background data is presented as this is worst-case given that the Defra concentrations predict a year-on-year decrease in background concentrations for all pollutants.

Future Baseline

- 6.5.10 In the absence of the Project, it is anticipated that there would be reductions in air pollutant concentrations in the future. Background pollutant concentrations and emissions from newer vehicles (zero emission and Euro 6 / VI engine

emission standards) are expected to improve air quality over time, as older, more-polluting vehicles are replaced in the vehicle fleet. Decarbonisation of the vehicle fleet in response to Government policy such as the Transport Decarbonation Plan, and the Net Zero Highways Plan are expected to deliver future air quality improvements. These future air quality improvements are expected to lead to lower NO₂, PM₁₀ and PM_{2.5} concentrations than reported for the existing baseline by the time construction begins on the Project and by the time the Project is operational.

6.5.11 Table 6-9 summarises the predicted Defra background pollutant concentrations across the Project area for 2029 ('Year 1' of construction phase).

Table 6-9 – Summary of Defra 2029 background NO₂, PM₁₀ and PM_{2.5} Concentrations for the Project

Pollutant	2029 background pollutant concentrations (µg/m ³)		AQS Objective (µg/m ³)
	Maximum	Average	
NO ₂	16.8	6.0	40
PM ₁₀	15.8	12.8	40
PM _{2.5}	7.4	5.6	20

6.5.12 The predicted background concentrations presented in Table 6-9 are well below the relevant AQS objectives for each pollutant.

6.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

6.6.1 The following measures have been incorporated into the Project design which are associated with impact avoidance for air quality:

- Sensitive siting of temporary works (for the construction phase).
- Sensitive routeing and siting of infrastructure (for the operational phase).

Embedded Mitigation

- 6.6.2 The following embedded mitigation measures relevant to air quality are included as commitments in the draft Outline CEMP and draft Outline Construction Traffic Management Plan

Table 6-10 – Embedded Mitigation

Ref	Measure	Project phase	Responsible party
AQ1	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	Construction	Main Works Contractor
AQ2	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager / engineer or the site manager.	Construction	Main Works Contractor
AQ3	Display the head or regional office contact information.	Construction	Main Works Contractor
AQ4	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	Construction	Main Works Contractor
AQ5	Record all dust and air quality complaints (as required), identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Construction	Main Works Contractor
AQ6	Make the complaints log available to the local authority when asked.	Construction	Main Works Contractor
AQ7	Record any exceptional incidents that cause dust and / or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	Construction	Main Works Contractor
AQ8	Hold regular liaison meetings with other high risk construction sites within 250m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport / deliveries which might be using the same strategic road network routes.	Construction	Main Works Contractor
AQ9	Undertake on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.	Construction	Main Works Contractor
AQ10	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	Construction	Main Works Contractor
AQ11	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Construction	Main Works Contractor
AQ12	If required, agree dust deposition, dust flux, or real-time PM ₁₀ continuous monitoring locations with the Local Authority. Where possible, commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work commences on a particular activity. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	Construction	Main Works Contractor
AQ13	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Construction	Main Works Contractor
AQ14	Where required by Risk Assessment Method Statements (RAMS), erect solid screens or barriers around dusty activities or the site boundary so that they are at least as high as any stockpiles on site.	Construction	Main Works Contractor

Ref	Measure	Project phase	Responsible party
AQ15	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period and where the risk to receptors is present.	Construction	Main Works Contractor
AQ16	Avoid site runoff of water or mud.	Construction	Main Works Contractor
AQ17	Regularly maintain site fencing, barriers and scaffolding.	Construction	Main Works Contractor
AQ18	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below.	Construction	Main Works Contractor
AQ19	Cover, seed or fence stockpiles to prevent wind whipping.	Construction	Main Works Contractor
AQ20	Ensure all vehicles switch off engines when stationary - no idling vehicles.	Construction	Main Works Contractor
AQ21	Avoid the use of diesel- or petrol-powered plant equipment and use mains electricity or battery powered equipment where practicable.	Construction	Main Works Contractor
AQ22	Impose and signpost a maximum-speed-limit, as defined by the RAMS, on surfaced and unsurfaced haul roads and work areas (if long haul routes are required, these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where appropriate).	Construction	Main Works Contractor
AQ23	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Construction	Main Works Contractor
AQ24	Implement a Travel Plan that supports and encourages sustainable travel (e.g., public transport, cycling, walking, and car-sharing).	Construction	Main Works Contractor
AQ25	Where practicable, only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Construction	Main Works Contractor
AQ26	Where required, ensure an adequate water supply on the site for effective dust / particulate matter suppression / mitigation, using non-potable water where possible and appropriate.	Construction	Main Works Contractor
AQ27	Where practicable, use enclosed chutes and conveyors and covered skips.	Construction	Main Works Contractor
AQ28	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Construction	Main Works Contractor
AQ29	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.	Construction	Main Works Contractor
AQ30	Avoid bonfires and burning of waste materials.	Construction	Main Works Contractor
AQ31	Bag and remove any biological debris or damp down such material before demolition.	Construction	Main Works Contractor
AQ32	Re-vegetate earthworks and exposed areas / soil stockpiles to stabilise surfaces as soon as practicable.	Construction	Main Works Contractor
AQ33	Use Hessian, mulches or tackifiers (chemical adhesive to increase the stickiness of a surface) where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	Construction	Main Works Contractor

Ref	Measure	Project phase	Responsible party
AQ34	For temporary construction areas, AGIs and the Pump Facility, only remove the cover in small areas during work and not all at once.	Construction	Main Works Contractor
AQ35	Avoid scabbling (roughening of concrete surfaces) if possible.	Construction	Main Works Contractor
AQ36	Ensure sand and other aggregates are stored in bunded areas and are 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.	Construction	Main Works Contractor
AQ37	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers or sealed bags and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery or with other dust control measures.	Construction	Main Works Contractor
AQ38	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	Construction	Main Works Contractor
AQ39	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	Construction	Main Works Contractor
AQ40	Avoid dry sweeping of large areas.	Construction	Main Works Contractor
AQ41	Ensure aggregate transportation vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Construction	Main Works Contractor
AQ42	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Construction	Main Works Contractor
AQ43	Record all inspections of haul routes and any subsequent action in a site log book.	Construction	Main Works Contractor
AQ44	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	Construction	Main Works Contractor
AQ45	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Construction	Main Works Contractor
AQ46	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permit.	Construction	Main Works Contractor
AQ47	Access gates to be located at least 10 m from receptors where possible.	Construction	Main Works Contractor
AQ48	Ensure all off-road vehicles comply with the requirements of the European NRMM standards, where applicable. Use stage 4 NRMM as a minimum and stage 5 where practicable	Construction	Main Works Contractor

6.7 Preliminary Assessment of Potential Impacts

- 6.7.1 An assessment of potential Air Quality impacts from vehicle emissions has not been undertaken at this stage as traffic data is not available in the required format. This will be assessed and reported in the ES following screening of traffic data and engagement with relevant local authorities.
- 6.7.2 An assessment of NRMM emissions has not been undertaken at this stage as the required information is not yet available at the time of this assessment.
- 6.7.3 A preliminary construction dust assessment has been undertaken based on the information available at this stage. This will be reviewed and updated and reported in the ES.

Construction

- 6.7.4 The potential impacts for Air Quality associated with the construction phase are provided in Table 6-11.

Table 6-11 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Sensitive ecological and human receptors within 250 m of the construction boundary and within 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the Project site entrance(s).	High	Potential human health and ecological impacts and dust soiling as a result of fugitive dust emissions	Small for demolition, large for earthworks, medium for construction and large for trackout (the transport of dust from a construction site to the public road network by construction vehicles).	Construction Phase	Adverse	Direct
Sensitive ecological and human receptors within 200 m of roads that may be affected by the Project	High	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions. Will be determined and reported in the ES.	Will be determined and reported in the ES.	Construction Phase	Adverse	Direct
Sensitive ecological and human receptors within 200 m of construction	High	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates	Will be determined and reported in the ES.	Construction Phase	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
areas where NRMM are likely to be present.		as a result of construction vehicle emissions. Will be determined and reported in the ES.				

Operation

- 6.7.5 Back-up diesel generator emissions have been screened out of further assessment as there are no sensitive receptors identified within 200 m of the Pump Facility.
- 6.7.6 The potential impacts for Air Quality associated with the operational phase are provided in Table 6-12.

Table 6-12 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Sensitive ecological and human receptors within 200 m of the Pump Facility.	N/A	N/A	N/A	N/A	N/A	N/A
Sensitive ecological and human receptors within 200 m of roads that may be affected by the Project	High	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of vehicle emissions. Will be determined and reported in the ES.	Will be determined and reported in the ES.	Operational Phase	Adverse	Direct

Decommissioning

- 6.7.7 Potential Air Quality impacts associated with the decommissioning phase are anticipated to be smaller than the construction phase, as it is anticipated that the pipeline would be left in situ. Therefore, construction phase impacts have been assumed for the decommissioning phase as a worst-case. Reference should be made to Chapter 2: Project Description for further details of the decommissioning phase. The potential impacts for Air Quality associated with the decommissioning phase are provided in Table 6-13.

Table 6-13 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Sensitive ecological and human receptors within 250 m of the construction boundary and within 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the Project site entrance(s).	High	Potential human health and ecological impacts and dust soiling as a result of fugitive dust emissions	Small for demolition, large for earthworks, medium for construction and large for trackout.	Decommissioning Phase	Adverse	Direct
Sensitive ecological and human receptors within 200 m of roads that may be affected by the Project	High	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions. Will be determined and reported in the ES.	Will be determined and reported in the ES.	Decommissioning Phase	Adverse	Direct
Sensitive ecological and human receptors within 200 m of construction	High	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates	Will be determined and reported in the ES.	Decommissioning Phase	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
areas where NRMM are likely to be present.		as a result of construction vehicle emissions. Will be determined and reported in the ES.				

6.8 Additional Mitigation and Enhancement Measures

- 6.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 6.7.

Construction

- 6.8.2 No additional mitigation and enhancement measures have been identified for Air Quality for the construction phase at this stage.

Operation

- 6.8.3 No additional mitigation and enhancement measures have been identified for Air Quality for the operational phase as potential impacts have been scoped out at this stage.

Decommissioning

- 6.8.4 No additional mitigation and enhancement measures have been identified for the decommissioning phase at this stage.

6.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 6.9.1 Table 6-14 below summarises the preliminary assessment of potential significant effects associated with the Project. As stated previously, back-up diesel generator emissions have been scoped out of further assessment as there are no sensitive receptors identified within 200 m of the Pump Facility.

Table 6-14 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Sensitive ecological and human receptors within 250 m of the construction boundary and within 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the Project site entrance(s).	High	Construction and Decommissioning	Potential human health and ecological impacts and dust soiling as a result of fugitive dust emissions	Construction and Decommissioning phase	Embedded measures as outlined in the draft outline CEMP and detailed in Table A-13 of Volume 4 – Appendix 6.1: Construction Dust Assessment	Not significant.
Sensitive ecological and human receptors within 200 m of roads that may be affected by the Project	High	Construction, operational and decommissioning	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of	Construction, operational and decommissioning phase	Will be determined and reported in the ES	Will be determined and reported in the ES

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
			construction vehicle emissions.			
Sensitive ecological and human receptors within 200 m of construction areas where NRMM are likely to be present.	High	Construction and decommissioning	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle.	Construction and decommissioning phase	Will be determined and reported in the ES	Likely to be not significant due to temporary and transient nature – will be confirmed and reported in the ES.

6.10 Next Steps

Design Development

- 6.10.1 No potential Air Quality impacts have been identified at this stage that would require design changes to the Project. The design development of the Project will continue to be reviewed to assess potential Air Quality impacts. The Project's final design will be assessed and reported in the ES.

Engagement

- 6.10.2 Engagement will be undertaken with the local planning authorities to confirm the outcome of the construction traffic data screening.

Surveys

- 6.10.3 No air quality surveys are required for the ES.

Further Assessment

- 6.10.4 The preliminary construction dust risk assessment will be reviewed and reported in the ES to determine the risk category and associated mitigation measures to ensure dust impacts are not significant.
- 6.10.5 Construction and operational traffic flows will be screened to determine if further assessment is required. If required, detailed dispersion modelling of vehicle emissions will be undertaken and reported in the ES to determine potential Air Quality impacts and significant effects.
- 6.10.6 Further details of the NRMM are required to determine potential Air Quality impacts associated with the construction phase. These will be assessed and reported within the ES.

6.11 References

- Ref 6.1 His Majesty's Stationery Office (HMSO) (2010) The Air Quality Standards Regulations 2010, Statutory Instruments (SI) No, 1001.
- Ref 6.2 European Union (2008) Ambient Air Quality and Cleaner Air for Europe (2008/50/EC). Official Journal of the European Union.
- Ref 6.3 HMSO (2019) Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (SI 2019/74).
- Ref 6.4 HMSO (2000) The Air Quality (England) Regulations 2000 (SI 2000/928).

- Ref 6.5 HMSO (2002) The Air Quality (England) (Amendment) Regulations 2002 (SI 2002/3043).
- Ref 6.6 The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020
- Ref 6.7 HMSO (1995) Environment Act 1995
- Ref 6.8 HMSO (2021) Environment Act 2021.
- Ref 6.9 HMSO (1990) Part III of the Environmental Protection Act.
- Ref 6.10 The Environmental Targets (Fine Particulate Matter) England Regulations 2023
- Ref 6.11 The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018
- Ref 6.12 Department of Energy Security and Net Zero (2023) Overarching National Policy Statement for Energy (EN-1).
- Ref 6.13 NPPF
- Ref 6.14 East Riding of Yorkshire Local Plan
- Ref 6.15 North Lincolnshire Local Development Framework Core Strategy
- Ref 6.16 North East Lincolnshire Local Plan 2013 to 2032
- Ref 6.17 The Institute of Air Quality Management (IAQM) (2024) Guidance on the Assessment of Dust from Demolition and Construction
- Ref 6.18 The Environmental Protection UK (EPUK) and IAQM (2017) Guidance on Land Use Planning and Development Control: Planning for Air Quality
- Ref 6.19 Department for Environment, Food and Rural Affairs (Defra) (2022) Local Air Quality Management Technical Guidance (LAQM.TG(22))
- Ref 6.20 IAQM (2020) Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites
- Ref 6.21 National Highways (2024) Design Manual for Roads and Bridges (DMRB) LA105 Air Quality

7 Ecology and Biodiversity

7.1 Introduction

- 7.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Ecology and Biodiversity. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 7.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Ecology and Biodiversity effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 7.1.3 This chapter should be read in conjunction with:
- Chapter 6: Air Quality – relevant due to the potential for changes in air quality, including nitrogen deposition, from construction traffic and plant emissions. This may affect sensitive ecological receptors and designated sites. As part of the Environmental Statement (ES), the Affected Road Network (ARN) will be used to identify any designated sites within the 200 m buffer.
 - Chapter 8: Climate Resilience - relevant because climate change projections (e.g. increased flood risk, sea level rise, and temperature extremes) may influence the resilience of ecological receptors and the effectiveness of mitigation and enhancement measures. Ecological design measures such as habitat connectivity, riparian planting, and wetland creation also contribute to climate change adaptation.
 - Chapter 10: Ground Conditions and Hydrogeology – relevant because ground conditions, soils, and hydrological connectivity influence the sensitivity of ecological receptors, including aquatic and wetland habitats. Potential pathways for pollution (e.g. sediment mobilisation, bentonite breakout, fuel spills) are mediated through geology and groundwater, which could in turn affect habitats and species. Soil stripping and reinstatement are also critical for habitat recovery and long-term ecological resilience.
 - Chapter 12: Landscape and Visual for interactions between landscape mitigation and ecological assessment and mitigation.

- Chapter 14: Socio-economics, Recreation and Tourism, for the potential effects on designated and non-designated sites which can be used as touristic and recreational sites.
- Chapter 16: Traffic and Transport – for interactions between traffic and the natural environment.
- Chapter 18: Hydrology and Land Drainage – relevant because hydrological regimes strongly influence aquatic and wetland habitats, as well as species such as fish, amphibians and aquatic mammals. Construction activities could alter surface water flows, increase sedimentation or change drainage patterns, with consequent effects on ecological receptors. Cross-reference with this chapter ensures that water quality and flow-related risks to biodiversity are fully assessed.
- Chapter 19: Major Accidents and Disasters due to the interactions on intertidal areas during construction and operation.
- Chapter 20: Coastal Processes – relevant because coastal and estuarine processes influence the condition and stability of intertidal habitats such as mudflats, saltmarsh and sandflats, which are critical for designated ecological features. Potential changes in sediment transport, erosion and deposition from landfall construction could affect benthic species, fish, birds and marine mammals. Cross-reference with this chapter ensures that linkages between ecological receptors and physical coastal processes are fully assessed.

7.1.4 This chapter is supported by the following figures:

- Volume 3 - Figure 7.1: Designated Sites
- Volume 3 - Figure 7.2: Non-statutory Designated sites
- Volume 3 - Figure 7.3: Priority Habitats, Ancient Woodland and Arboricultural Features
- Volume 3 - Figure 7.4: UKHab Plan

7.1.5 This chapter is supported by the following appendices:

- Volume 4 - Appendix 7.1: Ecological Appraisal
- Volume 4 - Appendix 7.2: Survey Methodology
- Volume 4 - Appendix 7.3: Intertidal Environment and Marine Ecology
- Volume 4 - Appendix 4.1: Draft Construction Environmental Management Plan

7.2 Legislation, Policy and Guidance

Legislation

7.2.1 Legislation relevant to Ecology and Biodiversity is detailed in Table 7-1.

Table 7-1 – Summary of Legislation relevant to Ecology and Biodiversity

Legislation	How it is considered within this PEIR
Salmon and Freshwater Fisheries Act 1975 (as amended) (Ref 7.1)	The Project involves works in or near watercourses, and the assessment (see Survey Methodology (Volume 4 - Appendix 7.2)) will identify potential risks to fish populations from construction activities. Embedded mitigation will include measures to maintain water flow, control sediment release, and restrict in-channel works to appropriate seasonal windows. Hydrological conditions and surface water management, which underpin the effectiveness of these measures, are considered further in Chapter 18: Hydrology and Land Drainage. Where moderate or good habitat quality is identified and there is a likelihood of protected or notable fish species, further mitigation may include pre-construction fish surveys, fish rescue, and method constraints secured under Environment Agency permits. Further details will be provided in the ES.
Wildlife and Countryside Act 1981 (as amended) (Ref 7.2)	This chapter considers the provisions of the Act in relation to the protection of wild birds, animals, and plants listed in Schedules 1, 5 and 8, and the designation and protection of Sites of Special Scientific Interest (SSSIs). Ecological surveys have been undertaken or are ongoing to identify legally protected species and habitats that may be affected by the Project. The outcomes of these surveys, along with any required mitigation measures, will be reported in full in the ES. Embedded mitigation has been developed to avoid or reduce the risk of offences under the Act, such as disturbance to protected species or damage to places of shelter. Where avoidance is not possible, further measures (e.g. species licensing) will be considered and secured through the DCO and Construction Environmental Management Plan (CEMP).
Protection of Badgers Act 1992 (Ref 7.3)	Badger <i>Meles meles</i> surveys are ongoing within the draft Order Limits. Due to the sensitivity of badger records, the full survey findings will be reported in a confidential appendix to the ES. The assessment will inform the need for mitigation measures to avoid offences under the Act. These measures will be secured through a development licence, where required, or through the CEMP.
The Hedgerows Regulations 1997 (Ref 7.4)	Hedgerows within the draft Order Limits have been assessed as part of the habitat surveys presented in the Ecological Appraisal (Volume 4 - Appendix 7.1). This includes consideration of species composition and connectivity. Where potential removal is required, hedgerows will be evaluated against the criteria set out in the Regulations. The need for hedgerow removal notices will be reviewed at the appropriate stage, and mitigation, such as replacement planting or retention, will be incorporated into the landscape and ecological design strategy. Further details will be provided in the ES.
Countryside and Rights of Way Act 2000 (Ref 7.5)	This chapter considers potential impacts on SSSIs and the development of embedded and additional mitigation measures to protect designated site features.
Natural Environment and Rural Communities (NERC) Act 2006 (Ref 7.6)	The assessment has identified habitats and species of principal importance in England (listed under Section 41 of the Act) within the Zone of Influence (Zoi). These have been treated as Important Ecological Features (IEFs), where appropriate, and have informed the design, mitigation strategy, and future biodiversity enhancements. Further details will be provided in the ES, including how the Project supports wider biodiversity objectives in line with the NERC duty.
The Animal Welfare Act 2006 (Ref 7.7)	This is relevant to the Project where ecological mitigation measures involve the handling, capture, or translocation of animals, including reptiles, amphibians, and small mammals. Any such activities will be undertaken in accordance with recognised good practice and relevant licensing requirements. The welfare of protected species will be addressed through species-specific method statements and secured through the CEMP.
Marine and Coastal Access Act (MCAA) 2009 (Ref 7.8)	A dedicated intertidal environment and marine ecology appendix (Volume 4 - Appendix 7.3) supports this chapter and provides baseline information on designated marine sites, priority habitats, and species within the marine Zoi. The assessment informs the need for marine licensing and considers potential impacts on Marine Conservation Zones (MCZs), migratory fish, marine mammals, and benthic communities. Mitigation measures have been embedded into the Project design where feasible, and further assessment will be presented in the ES to support any marine licence application. Aspects of sediment transport, erosion and coastal morphology relevant to ecological receptors are also considered further in Chapter 20: Coastal Processes.

Legislation	How it is considered within this PEIR
The Eels (England and Wales) Regulations 2009 (Ref 7.9)	This chapter considers the presence of European eel <i>Anguilla anguilla</i> within the draft Order Limits, informed by desk study data and habitat suitability assessments (see Survey Methodology (Volume 4 - Appendix 7.2)). The species is considered likely to occur in several watercourses crossed by the Project. Embedded mitigation will be developed further within the ES and include seasonal timing restrictions, fish rescue where required, and permitting of relevant activities through the Environment Agency. Hydrological conditions and surface water management, which underpin the effectiveness of these measures, are considered further in Chapter 18: Hydrology and Land Drainage.
The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 7.10)	The Regulations require a screening assessment to determine whether the Project is likely to have significant effects on European sites (as defined in the Regulations), either alone or in combination with other plans or projects. A preliminary Habitats Regulations Assessment (HRA) Screening Report is being made available as part of the PEIR to enable consultees, including Natural England, to review the approach and preliminary conclusions prior to DCO submission. A final HRA Report will accompany the DCO application, including sufficient information to enable the Secretary of State, as the competent authority, to undertake an Appropriate Assessment (AA) where required.
The Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 7.11)	Field surveys (including those summarised in the Ecological Appraisal Volume 4 - Appendix 7.1) have identified locations of known or suspected invasive non-native species (INNS) within the draft Order Limits. Appropriate biosecurity measures and species-specific control protocols will be developed to ensure compliance with the Order, and these measures will be refined in the ES and secured through the CEMP.
Environment Act 2021 (Ref 7.12)	Although the statutory requirement for Biodiversity Net Gain (BNG) under the Environment Act 2021 is not yet in force for Nationally Significant Infrastructure Projects (NSIPs), the Act provides the legislative framework for its future application. The Project is committed to the delivery of BNG in line with the emerging policy context and forthcoming Government guidance for NSIPs. A preliminary BNG assessment has been undertaken to inform design development and demonstrate alignment with the objectives of the Environment Act. While this assessment is not presented within the PEIR, it will be developed further and reported in full as part of the ES and DCO application.
The Management of Hedgerows (England) Regulations 2024 (Ref 7.13)	While these Regulations are primarily aimed at landowners and land managers, the Project will take them into account during the design of hedgerow retention, planting, and long-term management proposals. Where hedgerows are retained or newly established as part of habitat creation or BNG commitments, their future management will align with the requirements of these Regulations.

Policy

National Planning Policy

- 7.2.2 National Planning Policy relevant to Ecology and Biodiversity is detailed in Table 7-2.

Table 7-2 – Summary of National Planning Policy relevant to Ecology and Biodiversity

Ref.	Policy Context	How it is considered within this PEIR
EN-1 (Ref 7.14)		
4.6.1	Projects should “not only avoid, mitigate and compensate harms, following the mitigation hierarchy, but also consider whether there are opportunities for enhancements”.	The mitigation hierarchy has been applied throughout the ecological assessment process, with embedded mitigation and avoidance measures incorporated into the design of the Project from an early stage. Where residual impacts are identified, additional mitigation or compensation is proposed. Opportunities to enhance biodiversity have also been considered through the development of habitat creation and enhancement measures, which will be refined in the ES and secured through the DCO.
4.6.2	Projects should “consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver biodiversity net gain”.	The Project’s design seeks to improve habitat quality, connectivity, and resilience, thereby supporting services such as pollination, carbon storage, water quality, and landscape character. Although BNG is not yet a legal requirement for NSIPs, a preliminary assessment has informed the identification of opportunities to improve ecological functions in line with this policy. Further details will be presented in the ES.
4.6.6	“Energy NSIP proposals, whether onshore or offshore, should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity, and the wider environment where possible”.	The Project is being developed in accordance with this policy by seeking to deliver BNG in line with emerging guidance for NSIPs and the wider objectives of the Environment Act 2021. This chapter outlines how ecological enhancement opportunities have been considered through habitat creation, restoration, and connectivity measures beyond mitigation and compensation. These opportunities will be developed further in the ES.
4.6.7	“Applicants for onshore elements of any development are encouraged to use the latest version of the biodiversity metric to calculate their biodiversity baseline and present planned biodiversity net gain outcomes. This calculation data should be presented in full as part of their application”.	The Project has used the latest version of the biodiversity metric (Defra’s Statutory Biodiversity Metric) to undertake a preliminary BNG assessment. This assessment has informed design decisions and helped identify opportunities for ecological enhancement. While the full BNG calculation is not presented in the PEIR, it will be submitted as part of the ES and in accordance with emerging NSIP expectations.
4.6.8	“Where possible, this [calculation] data should be shared, alongside a completed biodiversity metric calculation, with the Local Authority and Natural England for discussion at the pre-application stage”.	Guidance on the implementation of BNG for NSIPs is not yet available; however, the Project will endeavour to engage early with Natural England and relevant local planning authorities through the Discretionary Advice Service (DAS) and a dedicated ecological working group. These forums will be used to share emerging BNG information and seek input on the proposed approach to habitat creation and enhancement.
4.6.10	“Biodiversity net gain should be applied after compliance with the mitigation hierarchy and does not change or replace existing environmental obligations, although compliance with those obligations will be relevant to the question of the baseline for assessing net gain and if they deliver an additional enhancement beyond meeting the existing obligation, that enhancement will count towards net gain”.	The approach to calculating and securing BNG will be refined for the ES, in accordance with emerging NSIP guidance and policy.
4.6.11	“Biodiversity net gain can be delivered onsite or wholly or partially off-site. We encourage details of any off-site delivery of biodiversity net gain to be set out within the application for development consent”.	The Project is considering a combination of on-site and off-site BNG delivery to achieve measurable ecological improvements. Opportunities for habitat creation and enhancement within the draft Order Limits are being explored alongside potential off-site contributions where necessary to secure strategic and landscape-scale benefits. Further details on the proposed approach to off-site delivery, including

Ref.	Policy Context	How it is considered within this PEIR
		location, mechanisms, and long-term management, will be provided in the ES and supporting BNG documentation.
4.6.12	“When delivering biodiversity net gain off-site, developments should do this in a manner that best contributes to the achievement of relevant wider strategic outcomes, for example by increasing habitat connectivity, enhancing other ecosystem service outcomes, or considering use of green infrastructure strategies. Reference should be made to relevant national or local plans and strategies, to inform off-site biodiversity net gain delivery. If published, the relevant strategy is the Local Nature Recovery Strategy (LNRS). If an LNRS has not been published, the relevant consenting body or planning authority may specify alternative plans, policies or strategies to use”.	Where off-site BNG delivery is required, the Project will seek to align with wider strategic outcomes such as improving ecological connectivity, supporting nature recovery, and delivering multifunctional benefits. The approach will be informed by relevant strategies and evidence bases within the Humber region (as per Para 4.6.12), which will guide the identification of suitable off-site receptor locations to maximise ecological and ecosystem service outcomes. Further details will be provided in the ES.
4.6.13	“In addition to delivering biodiversity net gain, developments may also deliver wider environmental gains and benefits to communities relevant to the local area, and to national policy priorities, such as: • <i>reductions in greenhouse gas emissions;</i> • <i>reduced flood risk;</i> • <i>improvements to air or water quality;</i> • <i>climate adaptation;</i> • <i>landscape enhancement;</i> • <i>increased access to natural greenspace; or</i> • <i>the enhancement, expansion or provision of trees and woodlands.</i>”	The Project seeks to deliver wider environmental gains alongside BNG, consistent with national policy priorities and local environmental objectives. Opportunities being explored include the use of native woodland and wetland planting to support flood attenuation and water quality improvements, enhancement of riparian habitats for climate resilience, and the creation of connected habitat corridors that contribute to landscape character. These measures aim to support local communities and ecosystem functions, and will be further developed in the ES and supporting documentation. These policy drivers also highlight the importance of climate change adaptation and resilience. Measures that enhance ecological connectivity and natural capital also contribute to climate resilience objectives (see Chapter 8: Climate Resilience and Adaption).
4.6.15	“Applications for development consent should be accompanied by a statement demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into proposals as part of good design (including any relevant operational aspects) of the project”.	This chapter considers opportunities for wider environmental net gains during both construction and operation, including habitat enhancement, natural flood management, and climate resilience measures. These have been embedded into the early design process as part of the good design principles applied to the Project. A more detailed account of how these opportunities have been incorporated into the final proposals will be provided in the ES.
4.6.17	“Where environmental net gain considerations have featured as part of the strategic options appraisal process to select a project, applicants should reference that information to supplement the site-specific details”.	Environmental net gain considerations have informed the site selection and route refinement process for the Project, alongside technical, environmental, and land use constraints. Where practicable, early decisions were made to avoid designated sites, priority habitats, and sensitive ecological features. Opportunities to deliver environmental enhancements (such as habitat connectivity and landscape-scale biodiversity improvements) have been integrated into the emerging design. Further detail on how these considerations informed the options appraisal will be set out in the ES.
4.6.1	(Secretary of State decision making) “Although achieving biodiversity net gain is not currently an obligation on applicants, Schedule 15 of the Environment Act 2021 contains provisions which, when commenced, mean the Secretary of State may not grant an application for a Development Consent Order unless satisfied that a biodiversity gain objective is met”.	A preliminary BNG assessment using the Defra Statutory Metric has informed the design process, and the final BNG position will be reported in the ES. The Project is committed to delivering measurable biodiversity net gain and will update its approach in line with any published guidance or legal requirements applicable at the time of DCO submission.

Ref.	Policy Context	How it is considered within this PEIR
5.12	“Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed by the Secretary of State in accordance with the Biodiversity and Geological Conservation section of NPS Section 5.4”.	The assessment will consider impacts of noise on ecological receptors as part of the Project. Specifically, in relation to underwater noise associated impacts.
5.4.8	“Development on land within or outside a SSSI, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits (including need) of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs”.	The PEIR identifies SSSIs located within the ZoI and considers potential impacts on their notified features. The design of the Project has been developed to avoid direct impacts on SSSIs where practicable, and embedded mitigation has been incorporated to minimise indirect effects (e.g. hydrological or noise disturbance). Where residual risks remain, these are assessed in detail and will be further evaluated in the ES, including justification for the location of the development and an assessment of whether the benefits clearly outweigh the potential impacts.
5.4.17	“Where the development is subject to EIA, the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats.”	This chapter identifies and assesses potential effects on designated sites at all levels (international, national, and local), as well as on legally protected and priority species and habitats. The assessment has been informed by desk studies and ecological surveys, with further detail to be presented in the ES, including site-specific mitigation and any residual effects. Irreplaceable habitats, where present, have been treated with particular caution in line with policy and guidance.
5.4.19	“The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.”	The Project has been designed to conserve and enhance biodiversity through the application of the mitigation hierarchy, early design measures to avoid sensitive ecological features, and proposals for habitat creation, enhancement, and connectivity. These include the retention of semi-natural habitats where possible, use of native planting, and integration of biodiversity-led landscaping. Further measures to deliver BNG and long-term ecological enhancements will be detailed in the ES and secured through the DCO and associated management plans.
5.4.20	“Applicants should consider wider ecosystem services and benefits of natural capital when designing enhancement measures.”	Where feasible, habitat creation and enhancement proposals have been designed to deliver multifunctional outcomes that go beyond BNG alone (such as contributions to carbon storage, pollination and climate resilience). Further details on how these outcomes are incorporated into the Project design and secured for the long term will be provided in the ES.
5.4.21	"The design process should embed opportunities for nature inclusive design. Energy infrastructure projects have the potential to deliver significant benefits and enhancements beyond Biodiversity Net Gain, which result in wider environmental gains.”	The Project has embedded opportunities for nature-inclusive design from an early stage, integrating ecological considerations into layout, routeing, and construction methods. A dedicated route walkover survey was undertaken to inform the emerging design, avoid IEFs, and target the route through areas of lower ecological value where practicable. Additional measures such as the retention and enhancement of semi-natural habitats, habitat connectivity, and biodiversity-led landscaping have also been incorporated. These will be further detailed in the ES.
5.4.22	“The design of energy NSIP proposals will need to consider the movement of mobile/migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure.”	Baseline surveys and desk studies have informed the identification of IEFs within the ZoI. The Project design has sought to avoid disruption to these species through sensitive routeing, the use of trenchless crossing techniques, and seasonal construction constraints. These measures will be refined in the ES and secured through mitigation and management plans.

Ref.	Policy Context	How it is considered within this PEIR
5.4.25	“The applicant should seek the advice of the appropriate SNCB and provide the Secretary of State with such information as the Secretary of State may reasonably require, to determine whether an HRA Appropriate Assessment (AA) is required. Applicants can request and agree ‘Evidence Plans’ with SNCBs, which is a way to record upfront the information the applicant needs to supply with its application, so that the HRA can be efficiently carried out. If an AA is required, the applicant must provide the Secretary of State with such information as may reasonably be required to enable the Secretary of State to conduct the AA. This should include information on any mitigation measures that are proposed to minimise or avoid likely significant effects.”	A preliminary HRA Screening Report has been prepared and is included as part of the PEIR to support early engagement with Natural England and other consultees. The report identifies European sites with potential connectivity to the Project and provides an initial assessment of likely significant effects. The Project team is engaging with Natural England through their DAS and intends to agree the scope and information requirements for the HRA. The need for an Appropriate Assessment is already anticipated, and as such, sufficient information will be provided at DCO submission, including details of any required mitigation measures.
5.4.32	“Applicants should include measures to mitigate fully the direct and indirect effects of development on ancient woodland, ancient and veteran trees or other irreplaceable habitats during both construction and operational phases.”	This chapter identifies and assesses potential impacts on irreplaceable habitats, including ancient woodland and ancient or veteran trees, using baseline data and specialist surveys. The Project has sought to avoid direct impacts through early design measures such as route refinement and, where applicable, the use of trenchless techniques to avoid sensitive habitats. Where these features are present within or near the draft Order Limits, appropriate buffers, working restrictions, and protection measures will be proposed. These measures will be further developed and secured through the ES and associated construction and management plans.
5.4.33	“Applicants should consider any reasonable opportunities to maximise the restoration, creation, and enhancement of wider biodiversity, and the protection and restoration of the ability of habitats to store or sequester carbon.”	Where practicable, degraded or low-value habitats will be reinstated with more ecologically functional alternatives. These proposals will be set out in detail within the ES and associated BNG and habitat management documentation.
5.4.34	“Consideration should be given to improvements to, and impacts on, habitats and species in, around and beyond developments, for wider ecosystem services and natural capital benefits, beyond those under protection and identified as being of principal importance. This may include considerations and opportunities identified through Local Nature Recovery Strategies, and national goals and targets set through the Environment Act 2021 and the Environmental Improvement Plan 2023.”	This chapter considers the potential to deliver habitat and species improvements both within and beyond the Order Limits, contributing to broader nature recovery objectives (see Section 7.6 and 7.8). Opportunities for delivering wider ecosystem service and natural capital benefits will be further explored and secured through the ES and long-term management plans.
5.4.35	“Applicants should include appropriate avoidance, mitigation, compensation and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: • during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; • the timing of construction has been planned to avoid or limit disturbance during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; • <i>habitats will, where practicable, be restored after construction works have finished;</i>	The Project applies the mitigation hierarchy, and avoidance, mitigation, compensation, and enhancement measures are integrated into its design. This includes minimising the working footprint, using trenchless techniques in sensitive areas, and scheduling works to avoid key breeding or migration seasons. Where habitat loss is unavoidable, the Project commits to restoration or replacement with ecologically appropriate habitats targeted to locations where the greatest biodiversity and ecosystem service benefits can be delivered. These measures have been informed by ecological surveys and will be secured through the ES.

Ref.	Policy Context	How it is considered within this PEIR
	- opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is required as mitigation, compensation, or enhancement, the location and quality will be of key importance. In this regard - habitat creation should be focused on areas where the most ecological and ecosystems benefits can be realised; - mitigations required as a result of legal protection of habitats or species will be complied with.”	
5.4.36	“Applicants should produce and implement a Biodiversity Management Strategy as part of their development proposals. This could include provision for biodiversity awareness training to employees and contractors so as to avoid unnecessary adverse impacts on biodiversity during the construction and operation stages.”	The Project will develop and implement a Biodiversity Management Strategy to guide the delivery of biodiversity commitments during construction and operation. Further details will be provided in the ES and secured through the DCO process.
5.4.44	In relation to mitigation and biodiversity net gain measures, “any habitat creation or enhancement delivered including linkages with existing habitats for compensation or biodiversity net gain should generally be maintained for a minimum period of 30 years, or for the lifetime of the project, if longer.”	Long-term management and monitoring provisions will be detailed in the ES and secured through the Biodiversity Management Strategy or equivalent mechanism.
EN-4 (Ref 7.15)		
2.21.30	“The ES must include an assessment of the biodiversity and landscape and visual effects of the proposed route and of the main alternative routes considered.”	The chapter assesses the biodiversity effects of the proposed route, informed by baseline ecological surveys and a route-specific walkover survey. Landscape and visual effects are provided in Chapter 12. Ecological constraints were a key consideration in route selection, with the alignment refined to avoid designated sites and sensitive habitats where practicable. A comparative assessment of main route alternatives, including how ecological and landscape factors influenced decision-making, is included in Chapter 3: Consideration of Alternatives.
2.21.31	“The [ES] application should also include proposals for reinstatement of the pipeline route as close to its original state as possible and take into account any requirements for agreements with the landowner to access areas for aftercare and management work. This is particularly important in designated landscapes.”	Section 7.6 and 7.8 outlines a commitment to reinstating habitats and land uses along the pipeline route in equal or better condition than their baseline. This includes the restoration of agricultural land, grassland, hedgerows, and field boundaries. Where required, access for aftercare and habitat management will be agreed with landowners to ensure long-term success of reinstatement and mitigation measures. Further details will be provided in the ES.
2.21.32	“Where it is unlikely to be possible to restore landscape to its original state, the applicant should set out measures to avoid, mitigate, or employ other landscape measures to compensate for, any adverse effect on the landscape.”	With the exception of the AGIs and the Pump Facility, the Project will be constructed predominantly underground. Habitats and land uses temporarily affected during construction will be reinstated to their former condition, or enhanced where practicable. Where full reinstatement cannot be achieved, tailored mitigation or compensation measures will be provided, appropriate to the local landscape context and set out in detail within the ES.
2.22.7	“In circumstances where the habitat to be crossed contains ancient woodland, ancient or veteran trees, trees subject to a Tree Preservation Order, or hedgerows subject to the Hedgerows Regulations 1997, the applicant should	The Project has sought to avoid sensitive features through early design refinement. Where avoidance is not possible, trenchless techniques are being considered to minimise ecological and landscape

Ref.	Policy Context	How it is considered within this PEIR
	consider whether it would be feasible to use HDD [Horizontal Directional Drilling] under the ancient woodland or thrust bore under the protected tree or hedgerow and the Secretary of State should consider requiring this, where not included in the proposal.”	impacts. The locations and justifications for trenchless crossings are provided in the PEIR and will be confirmed in the ES.
NPPF (Ref 7.16)		
187	“Planning policies and decisions should contribute to and enhance the natural and local environment by: a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;... ...d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures and incorporating features which support priority or threatened species such as swifts, bats and hedgehogs...”	This chapter considers ecosystem services and natural capital in the identification of mitigation and enhancement measures, including landscape-scale habitat connectivity, restoration of degraded features, and climate resilience. Opportunities to strengthen ecological networks and deliver wider environmental gains will be further developed and secured through the ES.
193	“When determining planning applications, local planning authorities should apply the following principles: a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused; b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest; c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists”.	The chapter applies the mitigation hierarchy in full, prioritising avoidance, then mitigation, and finally compensation where necessary. The Project has been designed to avoid direct impacts on SSSIs and irreplaceable habitats, including ancient woodland and veteran trees. Where proximity to sensitive features cannot be avoided, embedded mitigation such as trenchless crossings, buffer zones, and habitat reinstatement will be implemented. The ES will set out how any residual effects are addressed in line with NPPF policy and legal requirements.
A Green Future: Our	The Plan sets out the UK Government’s goals for improving the environment to achieve clean air, clean and plentiful water, thriving plants and wildlife, a	The Project supports the goals of the 25 Year Environment Plan by committing to habitat reinstatement, BNG, and the delivery of landscape-scale ecological enhancements. Ecological

Ref.	Policy Context	How it is considered within this PEIR
25 Year Plan to Improve the Environment (2018) (Ref 7.17)	reduced risk of harm from environmental hazards such as flooding and drought, using resources from nature more sustainably and efficiently and enhanced beauty, heritage and engagement with the natural environment. This will be achieved by (for example): • Restoring 750,000 ha of terrestrial and freshwater protected sites to favourable condition, securing their wildlife value for the long term; • Creating or restoring 500,000 ha of wildlife-rich habitat outside the protected site network, focusing on priority habitats as part of a wider set of land management changes providing extensive benefits; and • Increasing woodland in England by 12% cover by 2060 – this equates to planting 180,000ha by 2042.	mitigation and compensation measures have been designed to support habitat connectivity, nature recovery, and strategic green infrastructure. These measures aim to deliver benefits beyond the draft Order Limits, aligning with national objectives to create wildlife-rich spaces and improve ecosystem health.
UK Biodiversity Framework 2024 (Ref 7.18)	The Framework outlines how the four governments of the UK will work together to implement the Kunming-Montreal Global Biodiversity Framework. The Framework is based on four objectives: • To contribute to informing and developing the UK's position in international agreements and policy making; • To coordinate collective achievement of the UK's internal obligations; • To enable and support country input to reporting required under the UK's international obligations; and • To inform each other of domestic policy developments and collaborate to achieve shared aims where there is benefit in doing so at a UK level.	Action to address the biodiversity crisis and promote nature recovery has been (and will continue to be) taken into account in the design and development of the project. This includes the reinstatement of temporary habitat losses to equal or better value, compensation for permanent losses, and the delivery of biodiversity enhancement and strategic habitat creation at a landscape scale. These measures aim to contribute to the national goal of halting and reversing biodiversity decline in line with the Framework's objectives.

Local Planning Policy

- 7.2.3 Local Planning Policies relevant to Ecology and Biodiversity is detailed in Table 7-3.

Table 7-3 – Summary of Local Planning Policy relevant to Ecology and Biodiversity

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby Local Plan (Ref 7.19)	Policy SP18: Protecting and Enhancing the Environment	Requires that development ensures that ' <i>the high quality and local distinctiveness of the natural and man-made environment will be sustained</i> ' by safeguarding designated sites, ensuring developments enhance and manage features of biological interest through the delivery of BNG.	Through the application of the mitigation hierarchy during design development. Desk study and ecological surveys have informed the identification and avoidance / protection of designated sites, priority habitats, and species of principal importance. Embedded mitigation has been incorporated to minimise impacts, and opportunities for habitat creation and enhancement have been identified through a preliminary BNG assessment. Although BNG is not yet a legal requirement for NSIPs, the Project is committed to delivering measurable gains in biodiversity aligned with emerging legislation. Full details of proposed BNG measures and supporting justifications will be provided in the ES.
East Riding of Yorkshire Local Plan (Ref 7.20)	Policy S9: Strengthening blue/green infrastructure	Requires development to 'maintain, enhance and where possible create links between blue/green infrastructure features ⁵ . Links should be created both on-site and, where possible, with nearby blue/green infrastructure features.' The Policy also requires development to 'enhance blue/green infrastructure opportunities identified in Neighbourhood Plans'. The Policy also requires that 'development proposals within, or in close proximity to, a blue/green infrastructure corridor should contribute to enhancing the functionality and connectivity of the corridor'.	Through the identification, retention, and enhancement of blue and green infrastructure within and adjacent to the draft Order Limits. A baseline assessment has been undertaken to map existing ecological networks, watercourses, hedgerows, and priority habitats. Where possible, the Project avoids severance of these features, and where avoidance is not feasible, measures such as trenchless crossings and habitat reinstatement are proposed. Opportunities to strengthen ecological connectivity have been identified and will be further developed through the Biodiversity Management Strategy, which will be embedded into the design. Off-site habitat creation is also being considered to enhance wider landscape-scale connectivity and to align with Local Nature Recovery Strategy objectives. These commitments will be refined in the ES.
	Policy ENV2: Promoting a high quality landscape	Advises that 'all important hedgerows and trees are retained unless their removal can be justified in the wider public interest. Where important hedgerows and any trees are lost replacements will usually be required on-site'. The Policy also advises that development should 'maintain or enhance the character and management of woodland where appropriate' and 'retain, not detract from, and enhance wetland and water feature characteristics'.	Hedgerow assessments have been undertaken to identify 'Important' hedgerows (see the Ecological Appraisal (Volume 4 - Appendix 7.1)), and the use of existing gaps or defunct sections has been prioritised to minimise removal. Where hedgerow or tree loss is unavoidable, reinstatement to equal or improved condition is proposed, including species-rich planting to enhance ecological and landscape value. Woodland, wetland, and water features within or adjacent to the draft Order Limits have been identified and will be safeguarded by trenchless techniques or reinstatement to equal or improved condition. Full details will be set out in the ES and Landscape and Ecology Management Plans (LEMP).

⁵ Blue/green infrastructure features relevant to Ecology and Biodiversity include the following:

- International and nationally important sites for nature conservation;
- Other sites of strategic / local importance for nature conservation;
- Rivers (especially the Humber and Derwent) and other watercourses and drains, and all other waterbodies such as streams, wetland and ponds, their riparian corridors / floodplains and areas immediately adjacent to such features;
- Individual trees, hedgerows and woodland; and
- Wildlife corridors, including hedgerows, ditches, disused railways and verges.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
	Policy ENV4: International, National and Local Sites of importance for biodiversity	Emphasises the requirement to follow the mitigation hierarchy to ensure no loss / significant harm to sites of biodiversity importance. Advises on the requirement for evidence to allow the Local Authority to undertake a HRA. Where the development will result in the loss of land that is Functionally Linked to the Humber Estuary, Lower Derwent Valley or Thorne and Hatfield Moors, mitigation land will be required.	The Project design incorporates trenchless crossings and other avoidance measures to reduce direct and indirect impacts on internationally, nationally, and locally important sites. A preliminary HRA Screening Report has been submitted as part of this PEIR to facilitate early engagement with Natural England and other consultees. The full HRA will accompany the DCO application, including any additional measures required to ensure that the integrity of European sites is protected. Where loss of functionally linked land cannot be avoided, the full HRA will detail an appropriate mitigation solution to maintain site conservation objectives.
	Policy ENV5: Enhancing biodiversity and geodiversity	Emphasises that development proposals should ‘<i>conserve, restore, enhance or recreate</i>’ biodiversity features and ‘<i>safeguard, enhance, create and connect habitat networks</i>’. The Policy also advises that development should ‘<i>further the aims of the Local Nature Recovery Strategy and national Nature Recovery Network and other relevant strategic landscape-scale biodiversity initiatives</i>’. In addition, proposals must deliver a measurable BNG.	This chapter includes an assessment to identify habitat networks and ecological corridors, and where unavoidable impacts occur, mitigation and enhancement measures have been integrated into the design, including habitat reinstatement, species-rich hedgerow planting, and strategic habitat creation. A preliminary BNG assessment has informed the early design process and identified opportunities to enhance ecological function and connectivity. Although BNG is not yet mandatory for NSIPs, the Project aims to deliver a measurable net gain, aligning with national policy and the aims of the Local Nature Recovery Strategy and Nature Recovery Network. Further details on habitat creation, connectivity improvements, and long-term management will be included in the ES and the Biodiversity Management Strategy.
North Lincolnshire Local Development Framework Core Strategy (Ref 7.21)	Policy CS16: Landscape, Greenspace and Waterscape	This policy specifies the need for the protection and enhancement of landscape character, green infrastructure, and waterscapes; the safeguarding of important trees, hedgerows, and woodlands; and the sensitive integration of development with natural features.	By integrating ecological and landscape considerations into route selection, design development, and mitigation planning. The draft Order Limits have been refined to avoid impacts on IEF where practicable, and embedded mitigation includes the use of trenchless crossings, reduced working widths, and targeting of existing gaps in hedgerows to minimise loss of linear features. Where removal is unavoidable, reinstatement and enhancement measures will be secured through the ES and Biodiversity Management Strategy.
	Policy CS17: Biodiversity	Aims to safeguard protected sites, maintain and promote a ‘ <i>North Lincolnshire network of local wildlife sites and corridors, links and stepping stones between areas of natural green space</i> ’ and ensure that development retains, protects and enhances features of biological interest by delivering a net gain in biodiversity.	This chapter has identified all relevant internationally, nationally, and locally designated sites and priority habitats. The Project design has incorporated avoidance and minimisation measures, including trenchless crossings and micro-siting, to reduce impacts on biodiversity. A preliminary BNG assessment has informed early design decisions and identified opportunities for habitat restoration and creation. The Project is committed to delivering measurable biodiversity enhancements and will contribute to local habitat restoration targets through a Biodiversity Management Strategy that will be submitted with the ES.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
	Policy 9	Within the Mitigation Zone identified on the Policies Map, proposals which adversely affect the Humber Estuary SPA / Ramsar site due to the loss of functionally linked land will normally be required to provide their own mitigation in order to comply with the requirements of the Habitats Regulations.	Where relevant, detailed mitigation will be provided for impacts to the Humber Estuary SPA and Ramsar site. This is contained within this chapter and will further be detailed within the HRA for the Project.
North East Lincolnshire Local Plan 2013 to 2032 (Ref 7.22)	Policy 40: Developing a green infrastructure network	Details the expectation that development will ‘maintain and improve the network of green infrastructure’.	The baseline assessment has mapped baseline habitats, including hedgerows, ditches, woodland blocks, and designated nature conservation sites. Where direct impacts on such features are unavoidable, embedded mitigation includes trenchless crossings, habitat reinstatement, and species-rich planting to restore or enhance network functionality.
	Policy 41: Biodiversity and Geodiversity	Emphasises that development should ‘protect, manage and enhance’ sites of biological importance, ‘retain, protect, restore and enhance’ features of biodiversity value and ‘retain, protect and restore the connectivity between components of the Borough’s ecological network.’	IEFs have been identified through desk studies and field surveys, and where impacts are predicted, the mitigation hierarchy has been applied to avoid, minimise or compensate for potential harm. The draft Order Limits have been refined to retain and protect IEFs, including through the use of trenchless techniques and micro-siting to avoid sensitive areas. Where features such as hedgerows, woodland, or watercourses are unavoidably affected, reinstatement and enhancement measures are proposed. Opportunities to enhance connectivity between ecological network components and to support long-term conservation objectives will be detailed in the ES.
	Policy 42: Landscape	‘Retain and protect trees and hedgerows which offer value for amenity, biodiversity and landscape’.	Appendix 7.1 presents a comprehensive baseline assessment, comprising hedgerow surveys and an arboricultural review of Tree Preservation Orders (TPOs), which has informed route design and construction planning. The Project has sought (and will continue to seek) to avoid impacts to trees and hedgerows wherever practicable, through measures such as micro-siting and the use of trenchless crossing techniques. Where removal is unavoidable, reinstatement and enhancement measures are proposed, including species-rich planting to improve biodiversity value. These measures will be detailed within the ES and secured through the Biodiversity Management Strategy, LEMP, and the CEMP.

Guidance

7.2.4 The Ecology and Biodiversity assessment has been carried out in accordance with the following guidance:

- Chartered Institute of Ecology and Environmental Management (2024) (Ref 7.23) guidance (herein referred to as the 'CIEEM guidelines') aims to promote good practice and a scientifically transparent approach to Ecological Impact Assessment (EcIA).
- District Level Licensing (2022) (Ref 7.24) (DLL) is a Natural England led alternative approach to mitigation licensing to develop sites which could affect great crested newts *Triturus cristatus*. The approach aims to increase the number of great crested newts by providing new / better habitats in targeted areas to benefit their wider population. The DLL approach includes strategic area assessment, the identification of risk zones and strategic opportunity area maps. Where a DLL scheme is in place, developers can make a financial contribution to strategic, habitat compensation (documented within an Impact Assessment and Conservation Payment Certificate (IACPC)) instead of applying for a separate licence or carrying out individual detailed surveys.
- Environment Agency and Marine Management Organisation (MMO) Guidance (see Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3)) - Provides specific guidance on licensing, habitat protection, and flood risk assessment for development in coastal and marine areas.

7.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

7.3.1 A summary of the relevant Ecology and Biodiversity aspects of the EIA Scoping Opinion, together with our responses, together with the Applicant's responses, is set out in the following tables:

- Table 7-4: comments from the Planning Inspectorate.
- Table 7-5: comments from Natural England.
- Table 7-6: comments from the Canal and River Trust, Environment Agency and MMO.
- Table 7-7: comments from Local Planning Authorities.

Table 7-4 – Planning Inspectorate EIA Scoping Opinion – Summary of Ecology and Biodiversity Matters

Summary of Matters Raised	Response
Designated sites within the Humber Estuary and River Derwent IEFs are over 3 km from the Pump Facility and AGIs. No perceivable operational impact pathways exist; the Inspectorate agrees this matter can be scoped out of the ES.	Noted. The operational phase effects on the Humber Estuary and River Derwent IEFs have been scoped out in accordance with the Inspectorate's advice.
Eastoft Meadow SSSI, Eskamhorn Meadows SSSI, South Ferriby Chalk Pit SSSI and Thorne and Hatfield Moors SPA are located over 3 km from AGIs / Pump Facility and access roads. The Inspectorate agrees there are no perceivable operational or decommissioning impact pathways; this matter can be scoped out of the ES.	Noted. These designated sites have been scoped out of the operational and decommissioning phases in line with the Inspectorate's recommendation. It is also proposed that South Ferriby Chalk Pit SSSI and Thorne and Hatfield Moors SPA are scoped out of all phases of this assessment. Justification for this is provided in the Ecological Appraisal (Volume 4 - Appendix 7.1).
Several designated sites are located upstream or at sufficient distance such that significant effects are unlikely and can be scoped out of the ES. However, The Lagoons SSSI and Sugar Mills Ponds LNR cannot be scoped out unless subsequent agreement is reached with Natural England and relevant consultees that no likely significant effects would occur, given potential for indirect construction-related pollution impacts.	Thorne Moor SAC, Humberhead Peatlands National Nature Reserve (NNR), Thorne, Crowle and Goole Moors SSSI, Kirmington Pits SSSI, Kelsey Hill Gravel Pits SSSI, and Lower Derwent SAC have been scoped out in accordance with the Inspectorate's agreement. Crowle Borrow Pits SSSI and Hatfield Chase Ditches SSSI have, however, been included as a precaution due to their proximity to proposed construction routes. In response to the Inspectorate and Natural England's comments, potential indirect construction-phase impacts on The Lagoons SSSI have been assessed within the PEIR, with particular focus on pollution risk pathways (e.g. surface water runoff, dust). This site has therefore been retained for further consideration, pending any future agreement of no likely significant effects with Natural England. However, it is proposed that Sugar Mills Ponds LNR is scoped out of all phases of the assessment. Justification for this is provided in the Ecological Appraisal (Volume 4 - Appendix 7.1).
Certain non-statutory designated sites present no perceivable operational impact pathways; the Inspectorate agrees these can be scoped out of the ES.	Noted. Potential impacts to the following non-statutory designated sites during the operational phase have been scoped out of the assessment in line with the Inspectorate's agreement: Meadow Area 4 LWS, Goxhill Meadows LWS, Alder Wood LWS, Burnham Manor Quarry LGS, Ulceby Vale Quarry LGS, Bonby Road Verge LWS, Sandhills Quarry LWS, Burton upon Stather Brick Pit LWS, Burton Wood LWS, Normanby Park LWS, Big Hole LWS, East Halton Dismantled Railway LWS, Rosper Road Pool LWS, Homestead Park Pond LWS, Scrub Lane East Field LWS, Houlton's Covert LWS, Swinster Lane Field LWS, East View Meadow LWS, Crowle Moor LWS, Carlton Park Pond SINC, Southfield Reservoir LWS, Frodingham – Winestead LWS, Yorkshire East Gullet LWS, and Rawcliffe LWS. It is proposed, conditional to the Inspectorate's agreement, that the following sites have no perceivable impact pathways and should therefore not be carried forward for assessment within the ES: A15/A1077 Road Verges LWS, Alder Carr Wood LWS, Bagmoor Gullet LWS, Beacon Hill Road Verge LWS, Burnham Lodge Quarry LWS, Burnham Road LWS, Deepdale LWS, Deepdale Quarry Road Verges LWS, Derrythorpe LWS, Melton Ross Quarry LWS, Melton Ross Road Verges LWS, New Barnetby Road Verges LWS, Race Lane Verges LWS, South Ferriby Chalk Springs LWS, South Ferriby Churchyard LWS, Sykes Lane Meadows LWS, Warping Drain, Wold Road LWS and Wootton Grange LWS.
The applicant proposes to scope out potential impacts on arboricultural features, ancient woodland, and priority habitats during operation and decommissioning. The Inspectorate agrees	Noted. As confirmed in the Ecological Appraisal (Volume 4 - Appendix 7.1), no ancient woodland occurs within the draft Order Limits; the nearest parcels (>610 m away) have no hydrological

Summary of Matters Raised	Response
that there are no perceivable pathways for significant effects on these habitat features and that this matter can be scoped out of the ES	connectivity, and indirect effects (e.g. dust / machinery emissions) are not anticipated to be significant at this distance. Arboricultural features have been assessed, with no confirmed veteran trees within the draft Order Limits, though potential veterans will be reassessed and reported in the ES. Priority habitats are present within the draft Order Limits, with the most significant areas carried forward as IEFs. At this stage, arboricultural features, ancient woodland and priority habitats are not predicted to be significantly affected during operation or decommissioning and are scoped out of the ES.
No conclusive records exist in connected watercourses for white-clawed crayfish <i>Austropotamobius pallipes</i> , and dormouse <i>Muscardinus avellanarius</i> is considered absent from the study area. The Inspectorate agrees that, subject to confirmation within the ES, significant effects are unlikely, and these species can be scoped out of further assessment.	Noted. As confirmed in the Ecological Appraisal (Volume 4 - Appendix 7.1), the Project lies outside the natural range of both white-clawed crayfish and dormouse. A single anomalous record of crayfish could not be verified through subsequent EA surveys, and the species is therefore considered likely absent; dormouse is also absent from the Zol. Both species will be reviewed again and reported in the ES, and if absence is confirmed, they will be scoped out of further assessment.
The Inspectorate agrees that significant effects on freshwater fish, reptiles, water vole <i>Arvicola amphibius</i> and INNS are unlikely during operation, and that these matters can be scoped out of the ES. Subject to the pipeline remaining in situ, the Inspectorate also agrees that significant decommissioning effects on freshwater fish and reptiles are unlikely. However, until it can be confirmed that breeding birds are not present within proximity to the AGIs, there is insufficient evidence to scope out potential decommissioning effects on birds.	Potential impacts to INNS, freshwater fish and reptiles during operation and decommissioning have been scoped out of the assessment, consistent with the Inspectorate's position and the plan for the pipeline to remain in situ (as detailed in Chapter 2: Project Description). With regard to breeding birds, the PEIR has retained this receptor for further assessment during the decommissioning phase. The potential for impacts arising from AGI removal will be assessed based on the proximity of suitable nesting habitat. If appropriate, agreement will be sought with relevant consultees to scope this matter out at a later stage, subject to confirmation of baseline conditions and mitigation measures.
The applicant proposes to scope out a detailed assessment of great crested newt (GCN) on the basis that impacts will be addressed through licensing and mitigation under the Natural England DLL scheme. The Inspectorate welcomes this approach but advises that, for transparency, a summary of the Ecological Appraisal findings should also be presented in the ES.	Noted. A summary of the GCN assessment is included in the Ecological Appraisal (Volume 4 - Appendix 7.1) and will be provided in the main ES. This approach aligns with the Inspectorate's advice and ensures transparency in how potential effects on GCN have been managed.
Assessment of potential impacts on fish from electromagnetic fields (EMFs) associated with the buried cable connection between the Pump Facility and Salt End South Substation, particularly where the route crosses main rivers.	The potential for EMF impacts on fish receptors associated with the buried electrical connection has been considered in the PEIR. Given the likely cable depth and shielding, the risk of significant EMF-related effects on fish is considered negligible. Nevertheless, a precautionary assessment will be included in the ES, with cross-reference to relevant embedded design measures and trenchless crossing techniques where applicable. Further consultation with the Environment Agency will be undertaken to confirm the adequacy of this approach.
Potential for disturbance, habitat loss and fragmentation effects on owls (including barn owls <i>Tyto alba</i> and owl boxes), which should be assessed in the ES where significant effects are likely.	The potential for impacts on barn owls has been considered in the PEIR. Consultation with the East Yorkshire Barn Owl Conservation Group has been undertaken to inform baseline understanding and known nest box locations have been reviewed. Habitats within the draft Order Limits have also been assessed for suitability, and the potential for disturbance, habitat loss, and fragmentation during construction has been considered. The ES will include a targeted assessment of likely significant effects and proposed mitigation where relevant.

Summary of Matters Raised	Response
Expectation that the ES includes a transparent Biodiversity Net Gain (BNG) assessment using an appropriate metric, with a clear distinction between mitigation / compensation for significant adverse effects and wider biodiversity enhancements.	A preliminary BNG assessment using the Defra Statutory Biodiversity Metric has informed the design process, and the final BNG position will be reported in the ES. The Project is committed to delivering measurable BNG and will update its approach in line with any published guidance or legal requirements applicable at the time of DCO submission. Mitigation for significant adverse effects will also be considered separately from wider biodiversity enhancements to ensure transparency in the assessment and reporting of net gain outcomes.
Consideration of all relevant diadromous fish across fresh, transitional and coastal waters, ensuring marine fish species are addressed consistently between chapters. The ES may assess impacts in one place but must include clear cross-referencing between chapters.	To aid clarity, all relevant diadromous fish species have been considered within this chapter, covering freshwater, transitional, and coastal waters. Marine fish species have also been considered within this chapter due to their ecological relevance and overlap with designated sites and migratory species. This approach will also be applied in the ES, which will include improved cross-referencing to Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3) to ensure receptors and potential impact pathways are clearly signposted and consistently assessed across the relevant chapters.
Habitat suitability for nightjar within the draft Order Limits and adjacent fields should be established through a desk-based assessment, in line with Natural England's advice.	A desk-based assessment of habitat suitability for nightjar has been undertaken and is included within the Ecological Appraisal (Volume 4 - Appendix 7.1). This assessment concluded that the habitats present within the draft Order Limits and Zol are unsuitable for nightjar (foraging and breeding) and was informed by consultation with Natural England.
The potential for vibration impacts from HDD activities should be assessed where significant effects on IEFs are likely.	The potential for vibration effects from HDD activities on relevant IEFs has been considered within this chapter. Where IEFs occur within the Zol to proposed HDD locations, a precautionary approach has been taken. The ES will assess the potential for significant effects and incorporate mitigation as appropriate.
Sensitive ecological information that could give rise to disturbance, persecution or exploitation if published should be presented in a confidential annex to the ES.	Agreed. Sensitive ecological information has not been included in the PEIR but will be presented in a confidential annex to the ES, with a placeholder included in the published Ecology and Biodiversity chapter to confirm its submission.
The proposed pipeline route crosses the Holderness Coast intertidal area and advised that potential effects on this receptor should be considered in the ES.	Noted. The assessment of impacts to the Holderness Coast intertidal area is included within this chapter. A cross-reference from Chapter 19: Major Accidents and Disasters has already been provided to this assessment.
Agreed that significant effects on intertidal Ecology and Biodiversity receptors during operation or decommissioning are unlikely. However, the Inspectorate highlighted the MMO's view that such impacts should not be scoped out without further discussion. The Inspectorate also advised that the ES should clearly cover all intertidal areas potentially affected by the Project and include clear signposting to relevant assessments.	Noted. Intertidal ecology has been incorporated into this chapter of the PEIR rather than presented in a standalone chapter, ensuring full coverage of all intertidal receptors. This approach will also be applied in the ES, with only coastal processes remaining as a separate chapter (Chapter 20). Engagement with the MMO is ongoing (also see Summary of Engagement, below) to confirm agreement on operational scope. Based on current information, no significant operational or decommissioning impacts are anticipated, and these matters are therefore scoped out.
Advised that the ES should assess the potential for barriers to fish migration or alteration of fish behaviour arising from the proposed development, where significant effects are likely.	Noted. The potential for barriers to fish migration and alteration of fish behaviour has been considered within this chapter, including freshwater, transitional and coastal waters. Relevant mitigation measures embedded into the Project design include trenchless crossings and seasonal working restrictions. In addition, procedural safeguards such as fish rescue protocols will be secured through the CEMP. The ES will include a precautionary assessment of potential effects,

Summary of Matters Raised	Response
	supported by cross-reference to Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3) and consultation with the Environment Agency.
Queried how coastal and intertidal impacts would be addressed in the ES. They noted that the Scoping Report proposed a separate chapter for these receptors but advised that all intertidal areas potentially affected by the Project must be fully covered and clearly signposted. The Inspectorate also referred to matters raised by the MMO, who advised that operational and decommissioning impacts on intertidal Ecology and Biodiversity receptors should not be scoped out without further discussion. Specific reference was made to designated sites within the Humber Estuary (Ramsar, SAC, SPA and SSSI), as well as benthic ecology, fish, birds, mammals and INNS.	Noted. To avoid duplication, intertidal ecology has been incorporated into this chapter of the PEIR rather than presented in a standalone chapter, with only coastal processes retained in Chapter 20. This ensures comprehensive coverage of intertidal receptors including benthic ecology, fish, birds, mammals, INNS and relevant Humber Estuary designations. This approach will also be applied in the ES, with clear cross-referencing to Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3) and other relevant chapters. Engagement with the MMO is ongoing to confirm agreement on operational scope. Based on current information, no significant operational or decommissioning impacts are anticipated, and these matters are therefore scoped out.
Advised that potential ecological effects arising during the decommissioning phase should be considered within the Ecology and Biodiversity chapter of the ES.	Noted. Decommissioning impacts, that primarily relate to the removal of AGIs and the Pump Facility, have been addressed within this chapter. Any temporary land take, disturbance or pollution risks will be managed through the Decommissioning Environmental Management Plan (DEMP), alongside reinstatement of affected areas. As requested by the Inspectorate, this assessment is included within this chapter; no further action is required.

Table 7-5 – Natural England EIA Scoping Opinion – Summary of Ecology and Biodiversity Matters

Summary of Matters Raised	Response
Designated Sites: Advised that the ES should thoroughly assess potential impacts on European / internationally designated nature conservation sites, including marine sites where relevant. This includes consideration of noise and visual disturbance, potential effects on functionally linked land (FLL), and impacts to qualifying species of the Greater Wash SPA, Lower Derwent Valley SPA / SAC / Ramsar site, River Derwent SAC, Humber Estuary SAC, and Thorne and Hatfield Moors SPA.	These matters were subsequently discussed in more detail with Natural England through the Discretionary Advice Service (see Summary of Engagement, Table 7-9), where agreement was sought on the scope of the HRA and the requirement for Appropriate Assessment. Designated sites identified by Natural England are included as IEFs. The ES and supporting HRA will assess potential direct and indirect effects, including disturbance pathways (noise, visual, vibration), water quality, and habitat loss / change. The assessment includes FLL for the main component species associated with the Humber Estuary and Lower Derwent Valley SPA and Ramsar sites. Impacts to SPA qualifying bird species and SAC qualifying species will be addressed, with the preliminary HRA providing a formal screening. An Appropriate Assessment will be undertaken as part of the DCO submission, if required. It is proposed that Thorne & Hatfield Moors SPA be scoped out for all phases of assessment, on the basis that no credible impact pathways have been identified. The justification for this conclusion is provided in the Ecological Appraisal (Volume 4 - Appendix 7.1).
Protected Species: Advised that the ES should comprehensively assess potential impacts on all protected species across all phases of the Project (construction, operation, decommissioning). Surveys should follow NE's standing advice, use the latest methodologies, and extend beyond the red line boundary where appropriate. Applicants should obtain records from local biological record centres and consider	Protected species are identified as IEFs. Desk study records have been obtained from local biological record centres and conservation groups, and survey methodologies are detailed in Volume 4 - Appendix 7.2. Field survey results are summarised in the Ecological Appraisal (Volume 4 - Appendix 7.1), with additional data to be reported in the ES. Surveys extend beyond the draft Order Limits where appropriate. The ES will assess impacts on protected species during all Project phases, and preliminary embedded mitigation measures are proposed in this chapter,

Summary of Matters Raised	Response
wider populations and habitat linkages. Natural England also advised that licensing requirements should be considered, and early engagement on DLL for great crested newts is encouraged.	which will be developed and refined for the ES. Where required, licences will be sought in consultation with Natural England.
Priority Habitats and Species: Advised that the ES should assess potential impacts on priority habitats and species, including brownfield / open mosaic habitat. Appropriate habitat, ornithological, botanical, and invertebrate surveys should be undertaken to establish baseline conditions. The ES should set out historical and new survey data, assess the status of habitats and species, and identify direct and indirect impacts. The ES should also consider ancient woodland and veteran trees, and set out mitigation, compensation and enhancement measures, including opportunities for BNG.	Priority habitats and species have been identified through desk study and field surveys, with results reported in the Ecological Appraisal (Volume 4 - Appendix 7.1). This includes review of the Natural England Open Mosaic Habitats Inventory and ground-truthing through habitat and botanical surveys. Further data collection, including targeted ornithological, botanical and invertebrate surveys, is ongoing and will be reported in the ES. The PEIR confirms that no ancient woodland is present within the draft Order Limits. Veteran trees have not yet been fully assessed and will be considered as part of the ES. The ES will evaluate the importance of all priority habitats and species, and apply the mitigation hierarchy to avoid, reduce and compensate for impacts. Preliminary embedded mitigation measures are presented in this PEIR and will be developed further for the ES. Opportunities for biodiversity enhancement, including delivery of BNG, will also be addressed.
Biodiversity net gain: Welcomed the commitment to deliver 10% BNG.	The Applicant notes the Government's intention to introduce mandatory BNG requirements for NSIPs from 2026. The Project will comply with the relevant legislation and policy at the time of submission, with details of the approach set out in the ES.

Table 7-6 – Canal and River Trust, Environment Agency and MMO EIA Scoping Opinion – Summary of Ecology and Biodiversity Matters

Summary of Matters Raised	Response
The Canal and River Trust advised that crossing their network has the potential to impact habitats associated with waterways, including vibration impacts from drilling / HDD and severance of riparian habitat corridors caused by construction compounds. They requested that watercourses and canals are explicitly identified as receptors. The Trust agreed that white-clawed crayfish can be scoped out, but highlighted that occupied owl boxes may need to be scoped in to prevent disturbance and fragmentation. They noted the known distribution of European eel on the Ouse and confirmed that eel should be included in the assessment. The Trust also recommended that mitigation for invasive non-native species follows Check–Clean–Dry protocols, with buffers applied around known locations. They further advised that buffers should be applied to riparian corridors, priority habitats, hedgerows, trees, and floral INNS. Finally, they requested that vibrational impacts of HDD on aquatic and riparian species (invertebrates, amphibians, otter <i>Lutra lutra</i> , fish) are explicitly scoped into the assessment.	Watercourses, canals, and riparian habitats have been identified as IEFs. Owl boxes recorded during UKHab surveys (see Ecological Appraisal (Volume 4 - Appendix 7.1)) are scoped into the ES bird assessment. European eel are scoped into the fish assessment, with distribution records considered as part of the baseline and impact analysis. Preliminary embedded mitigation measures set out in this PEIR include biosecurity toolbox talks and adherence to Check–Clean–Dry protocols, and the establishment of buffer zones around waterways, riparian corridors, priority habitats, and known INNS locations will be further developed in the ES. Vibrational impacts of HDD on aquatic and riparian species have been scoped into the ES and will be assessed in detail. Engagement with CRT will continue to ensure trenchless crossing methodology and protection of CRT assets and habitats are appropriately addressed.
The Environment Agency advised that additional references should be included, notably the Eels (England and Wales) Regulations 2009 and the Management of Hedgerows (England) Regulations 2024. They recommended the desk study include EA fish data (including TRaC waterbodies), Water Framework Directive (WFD) reasons for failing and mitigation measures, and the EA's Restoring Meadow, Marsh and Reed (ReMeMaRe) programme. Quantitative fish surveys should be	These issues were carried forward into direct engagement with the Environment Agency (see Table 7-8), where survey methodology and mitigation for HDD vibration effects were discussed and refined. This chapter incorporates the relevant legislative and policy references. Desk study data are presented in Appendices 7.1 and 7.2; WFD failure reasons will be incorporated in the ES. The

Summary of Matters Raised	Response
undertaken at relevant waterbodies, outside of spawning periods, with reliance on summer surveys, EA data and habitat assessments to inform salmonid populations. The EA advised that all relevant diadromous fish (e.g. salmonids <i>Salmo spp.</i>, shad <i>Alosa spp.</i>, smelt <i>Osmerus eperlanus</i>, eel) must be assessed across freshwater, transitional and coastal waters, and that cross-referencing between chapters is required. They noted that bullhead <i>Cottus gobio</i> are recorded locally and should not be scoped out. HDD vibration impacts on aquatic species should be scoped in, with trenchless crossings prioritised over open-cut methods and robust mitigation applied where trenchless techniques are not feasible. The EA requested that saltmarsh be included as a priority habitat. They recommended inclusion of species and habitats recorded in their screening (requesting confirmation of white-clawed crayfish records before this species is scoped out). Finally, they welcomed the proposed Biodiversity Enhancement Strategy and recommended that BNG delivery should align with River Basin Management Plans, Local Nature Recovery Strategies, WFD objectives and catchment plans, and should include intertidal habitats.	ReMeMaRe programme will be referenced where relevant (with further detail in the Summary of Engagement). White-clawed crayfish records are being verified, and this species will only be scoped out if confirmed absent from the affected waterbodies. Freshwater fish are identified as IEFs, and survey and assessment methodology has been agreed through consultation (see Summary of Engagement). This will include all relevant diadromous fish species, with assessment across freshwater, transitional and coastal waters. HDD vibration impacts on aquatic species have been scoped into the ES. Trenchless methods are prioritised, with mitigation applied where open cut is unavoidable (e.g. timing restrictions, fish rescues, pump inlet screening, and maintaining passage at cofferdams). Saltmarsh has been included as a priority habitat. The Biodiversity Enhancement Strategy and BNG delivery will be further developed for the ES, aligned with WFD objectives, River Basin Management Plans, Local Nature Recovery Strategies, catchment plans, and BS 8683:2021.
The MMO advised that the applicant's definition of mitigation should be amended, as offsetting constitutes compensation and should only be referred to as such within the HRA derogation process. They requested that the ES is structured so that terrestrial and marine impacts are presented in separate chapters, with marine topics including intertidal ecology, sediment and water quality, underwater noise and vibration, benthic ecology, fish and shellfish ecology, marine mammals, and marine ornithology, among others. The MMO listed a number of designated sites within or near the project's zone of influence (Humber Estuary SPA, SAC, Ramsar, SSSI, Holderness Inshore MCZ, Greater Wash SPA, and a number of SSSIs). They also noted proximity to the Southern North Sea SAC and highlighted the potential for impacts on harbour porpoise if piling were undertaken. MMO advised that cetaceans and seals should be scoped into the assessment as receptors, with a dedicated marine mammal's chapter, and that site integrity plans and marine mammal mitigation protocols may be required. The MMO noted the presence of red-throated divers <i>Gavia stellata</i> and recommended adherence to best practice protocols to minimise disturbance. They requested confirmation of the extent of intertidal works and consideration of potential impacts from cable protection. They also highlighted risks to commercial fisheries and recommended that potential impacts during operation (from accidental carbon dioxide release) and decommissioning (from localised works to make infrastructure safe) should not be scoped out at this stage, as these may affect intertidal and benthic ecology, fish and shellfish, and marine mammals. They further asked the applicant to justify the approach of leaving the pipeline in situ at decommissioning.	The definition of mitigation measures used in this PEIR is consistent with EIA guidance. The ES will ensure that where compensation is required as part of the HRA derogation process, this is clearly identified as compensation rather than mitigation. Ecology and biodiversity receptors, including intertidal features, are assessed within this chapter, with coastal processes addressed separately in Chapter 20. This approach avoids duplication while ensuring full coverage of marine and intertidal receptors. Cross-references between chapters will ensure clarity for consultees. Designated sites within the zone of influence and identified by the MMO, are included as IEFs. The MMO's comments regarding the Southern North Sea SAC were noted. Monopiling is not proposed for this Project, and no credible impact pathway to harbour porpoise has been identified. On this basis, the Southern North Sea SAC was not included in the assessment. The ES will consider potential impacts to Red-throated Diver and adopt appropriate management measures (if required). The extent of intertidal works has been confirmed within the draft Order Limits, and potential impacts of cable protection will be assessed in the ES. Ecology and biodiversity receptors, including intertidal features, are assessed within this chapter, with coastal processes addressed separately in Chapter 20. This chapter will continue to be presented as 'Ecology and Biodiversity' rather than 'Terrestrial Ecology and Biodiversity' to ensure integration across terrestrial and intertidal receptors.

Table 7-7 – Local Planning Authority EIA Scoping Opinion – Summary of Ecology and Biodiversity Matters

Summary of Matters Raised	Response
Elloughton-cum-Brough Town Council resolved that due to the lack of information available at this stage, they were unable to make an informed response. However, the Town Council raised concerns regarding the impact on wildlife and flooding along the Humber Estuary.	Noted. Wildlife within the Humber Estuary corridor, including designated sites and associated species, is identified as an IEF within this chapter.
East Riding of Yorkshire Council agreed with the designated sites scoped into the assessment and considered the scoping distances appropriate. They raised concerns regarding the adequacy of design stage mitigation for operational security and safety lighting at AGIs, particularly at Thorngumbald, where the sensitivity of surrounding land to ornithological receptors has not yet been established. They requested that this be scoped in until sufficient information is available to rule out impacts. The early attention given to locally designated sites was welcomed. The Council agreed with the conclusions in respect of protected species and supported scoping out impacts on breeding birds and fish during the operational phase on the basis that the pipeline will remain in situ. They also agreed with the scoping in of habitats of principal importance and advised that impacts on maritime cliff and slope habitats should be minimised, with works scheduled for summer to avoid enhanced erosion rates. They supported the approach to habitat creation and enhancement and agreed with the evidence-based approach to European Protected Species and tertiary mitigation. In relation to BNG, it was acknowledged that it is not yet mandatory for NSIPs but welcomed the applicant's commitment to the mitigation hierarchy, proactive conservation measures, and production of a Biodiversity Enhancement Strategy. They agreed with the identified impacts summarised in Section 7.10 of the Scoping Report.	Noted. Statutory designated sites and locally designated sites within the East Riding of Yorkshire are identified as IEFs within this chapter. Potential impacts of AGI security and safety lighting on sensitive ornithological receptors will be considered further for the ES, including at Thorngumbald AGI, to confirm whether significant effects can be ruled out. Protected species are identified as IEFs. On the basis that the pipeline will remain in situ during operation, impacts on breeding birds and fish have scoped out; however, construction-phase impacts are assessed within this chapter and supporting Appendices. Habitats of principal importance, including maritime cliff and slope, are identified as IEFs. The ES will consider measures to minimise erosion risk and, where appropriate, schedule works in summer to reduce adverse effects. Habitat creation and enhancement of retained habitats are included as preliminary embedded mitigation in this PEIR and will be further developed in the ES. The approach to European Protected Species and tertiary mitigation is evidence-based and will be refined through consultation with Natural England.
Lincolnshire County Council noted the presence of important ecological sites in the county, including statutory and non-statutory designated sites, and advised these should be considered in the ES and that that sufficient information should be provided to enable the Planning Inspectorate to undertake an HRA. They highlighted desk-based studies indicating the presence of protected species and recommended field surveys to confirm ecological value. LCC also referred to ancient woodland, which should be assessed, and requested that potential cumulative effects on ecological receptors be included. They raised the need for further detail on how BNG will be delivered and measured and noted that cumulative effects alongside other NSIP applications in the area should be addressed.	Noted. Ecological sites in Lincolnshire, including statutory and non-statutory designated sites, are identified as IEFs and considered in this chapter. Desk study data have been supplemented by targeted field surveys, with results presented in the Ecological Appraisal (Volume 4 - Appendix 7.1) and Survey Methodology (Volume 4 - Appendix 7.2). Ancient woodland has been assessed through desk study; none is present within the draft Order Limits, and veteran trees will be further considered in the ES. The ES will assess cumulative impacts on ecological receptors, taking into account other NSIP applications in the area. Delivery of BNG will be confirmed in the ES, with methodology aligned to emerging NSIP requirements, River Basin Management Plans, and Local Nature Recovery Strategies. A preliminary HRA Screening Report has been prepared and is included as part of the PEIR to support early engagement with Natural England and other consultees.
North Lincolnshire Council supported the principle of carbon capture and storage and welcomed the applicant's biodiversity enhancement proposals. They advised that the applicant should provide sufficient information for the competent authority to undertake a HRA, alone and in combination with other projects. Several SSSIs were noted, and it was advised that potential impacts on these should also be considered.	Noted. Statutory designated sites including the Humber Estuary SAC, SPA and Ramsar site, Thorne & Hatfield Moors SPA / SAC, and relevant SSSIs (including Humber Estuary, Eastoft Meadows, Crowle Borrow Pits, Thorne, Crowle and Goole Moors, South Ferriby Chalk Pit, Hatfield Chase Ditches, Kirmington Pits, and North Killingholme Pits) are identified as IEFs. Potential impacts are addressed within this chapter and the preliminary HRA.

Summary of Matters Raised	Response
Numerous Local Wildlife Sites (LWS) are present within the draft Order Limits and study area, some of which may be directly crossed by the Project and the importance of Keadby Ash Tip was highlighted. The applicant's commitment to survey was welcomed, and it was agreed that survey methods and effort are appropriate. It was noted that some areas had only been assessed via aerial photos and desk study and requested that these be supported by field surveys. Finally, the proposed embedded mitigation measures and approach to avoidance and alternatives were welcomed. It was recognised that a reasonable scoping summary was provided and advised that BNG should be quantified and deliverable using the statutory biodiversity metric, referring to the forthcoming >10% BNG requirement for NSIPs.	Non-statutory sites including LWS within the draft Order Limits and wider Study Area are also identified as IEFs. The PEIR acknowledges potential impacts on sites that may be directly crossed by the Project. Embedded mitigation measures are identified in the draft CEMP (Volume 4 - Appendix 4.1) and include pre-construction surveys, species-specific method statements, ECoW oversight, and habitat reinstatement, creation and enhancement. The draft CEMP will be further developed into an Outline CEMP for submission with the DCO and subsequently into a detailed CEMP prepared by the appointed contractor. The ecological importance of Keadby Ash Tip is recognised (it is an IEF), and the ES will consider potential impacts on its invertebrate assemblages and priority habitats. Desk study data have been supplemented with targeted field surveys; areas initially assessed via aerial photography have been ground-truthed, with results presented in the Ecological Appraisal (Volume 4 - Appendix 7.1) and methods in Survey Methodology (Volume 4 - Appendix 7.2). Species-specific survey results will be included in the ES. The approach to avoidance, alternatives, and mitigation is set out in this chapter and will be further refined for the ES. BNG will be delivered in line with the forthcoming NSIP requirements and reported in the ES.

Summary of Engagement

- 7.3.2 The engagement taken to date, and how it has been considered within the assessment process, is outlined below. In several cases, matters raised during the EIA Scoping Opinion remain under active discussion with consultees, with further assessment and agreement to be secured prior to the ES submission. The Summary of Engagement below documents how these issues have been progressed and highlights areas where resolution is still required.

Associated British Ports (ABP)

- 7.3.3 A meeting was held on 27 November 2024. With regard to Ecology and Biodiversity, ABP noted that their main concern is ensuring the integrity of the Newton Garth site. In response, this site has been identified as an IEF within this chapter.

Environment Agency

- 7.3.4 Meetings with the Environment Agency on matters relevant to Ecology and Biodiversity were held on 20 August 2024, 2 May 2025 and 25 July 2025. A summary of the issues raised, and the Applicant's responses is provided in Table 7-8.

Table 7-8 – Summary of Environment Agency Stakeholder Engagement relevant to Ecology and Biodiversity

Summary of Matters Raised	Response
The proposal crosses statutory main rivers within the search corridor. Any works affecting these watercourses will be of interest to the Environment Agency, and these assets should be protected. The protection and enhancement of biodiversity around watercourse corridors will need to be addressed. There needs to be an identification of any designated sites and protected habitats and species within the pipeline corridor and a suitable buffer, with evaluation of risks from the Project, including access roads and compounds. The Environment Agency also requested that BNG requirements be considered, with reference to Local Nature Recovery Strategies, Water Framework Directive mitigation measures, and the River Basin Management Plan.	All statutory main rivers within the search corridor are identified as IEFs. Protection of biodiversity around watercourse corridors will be secured through embedded mitigation, with opportunities for enhancement identified as part of the BNG assessment. Designated sites, habitats of principal importance, and protected / notable species are recognised as IEFs. BNG is included as embedded mitigation and delivery will be confirmed in the ES and aligned to River Basin Management Plans, Local Nature Recovery Strategies and WFD objectives.
The EA requested that awareness training on biosecurity and the potential spread of INNS be included in toolbox talks during construction. In relation to crossing techniques, the EA advised that suitability of waterbodies for supporting fish populations should be assessed before finalising the crossing method.	Biosecurity toolbox talks will be delivered to construction staff. These measures are identified in the draft CEMP (Volume 4 - Appendix 4.1) and will be refined in the Outline CEMP to be secured under the DCO and subsequently incorporated into the detailed CEMP prepared by the appointed contractor. Consultation with the Environment Agency regarding crossing methodology is ongoing.
Requested updates to the draft freshwater fish survey methodology, including use of the National Biodiversity Atlas, a precautionary approach to mitigation where suitable habitats are present, submission of pre-construction survey results, ECoW	The freshwater fish survey methodology, incorporating these suggestions, is provided in Survey Methodology (Volume 4 - Appendix 7.2).

Summary of Matters Raised	Response
oversight with fish rescue if required, and inclusion of habitat photographs.	

Local Planning Authorities

- 7.3.5 A meeting was held with **East Riding of Yorkshire Council** on 12 March 2025. The Council agreed with the designated sites scoped into the assessment, including the scoping distances, but advised that designated sites should remain scoped in for the operational phase in relation to potential impacts from AGI security and safety lighting, particularly at Thorngumbald AGI where the sensitivity of surrounding land to ornithological receptors has not yet been confirmed. In response, designated sites are identified as IEFs within this chapter, and potential operational impacts from lighting will be considered further in the ES.
- 7.3.6 The Council agreed with the scoping conclusions for protected species. On the basis that the pipeline will remain in situ following decommissioning, they supported scoping out operational impacts on breeding birds and fish. They also supported the use of DLL for great crested newt and recognised that derogation licences may be required for badger, bats, otter, and water vole. Protected species are identified as IEFs within this chapter, and survey work and licensing requirements are addressed in the Ecological Appraisal (Volume 4 - Appendix 7.1) and Survey Methodology (Volume 4 - Appendix 7.2).
- 7.3.7 The Council agreed with the scoping in of habitats of principal importance and advised that impacts on maritime cliff and slope should be minimised, with summer works scheduled where possible to reduce erosion risk. They also recommended habitat creation and enhancement in advance of works. Habitats of principal importance, including maritime cliff and slope, are identified as IEFs within this chapter, with embedded mitigation measures (e.g. habitat reinstatement and enhancement) included, and further details to be set out in the ES.
- 7.3.8 On biodiversity, the Council welcomed the commitment to the mitigation hierarchy and supported the production of a Biodiversity Enhancement Strategy, noting that while BNG is not yet mandatory for NSIPs, it should be delivered where possible. The Applicant's approach is to deliver a Biodiversity Management Strategy (previously referred to as the Biodiversity Enhancement Strategy) in line with emerging requirements, with quantification of BNG to be provided in the ES using the statutory metric.
- 7.3.9 **North Lincolnshire Council** (30 July 2024) advised at pre-application consultation that a HRA would be required, and that potential impacts on terrestrial SSSIs within North Lincolnshire must be considered, supported by a

CEMP. The Council highlighted the need for appropriate avoidance, mitigation and enhancement measures for local sites, priority habitats and species, including Keadby Ash Tip, and noted that the decision-maker will need to record evidence that the proposal meets the three tests of European Protected Species licensing. They also advised that measures should be in place to address any INNS encountered. Finally, the Council drew attention to the Government's commitment for BNG to apply to Nationally Significant Infrastructure Projects from November 2025, which has since been deferred to May 2026. In response, a preliminary HRA has been produced, SSSIs and Keadby Ash Tip have been identified as IEFs, and measures set out in the draft CEMP (Volume 4 - Appendix 4.1), including INNS biosecurity, are embedded within the Project and will subsequently be developed into the Outline CEMP to be secured under the DCO and detailed CEMP prepared by the contractor. Survey methodologies for protected and notable species are set out in Volume 4 - Appendix 7.2, with those scoped in detailed in this report, and BNG delivery will be confirmed and reported in full within the ES.

Natural England

- 7.3.10 Engagement with Natural England has taken place through a series of meetings and written correspondence during the pre-application stage, including meetings in May, August, October, November and December 2024, and January, February and March and May 2025. The key issues raised and how these have been addressed are summarised in Table 7-9 below.

Table 7-9 – Summary of Natural England Stakeholder Engagement relevant to Ecology and Biodiversity

Summary of Matters Raised	Response
Habitats Regulations Assessment Natural England confirmed that a HRA is required, with AA necessary for the Humber Estuary SPA and Ramsar site and the Lower Derwent Valley SPA and Ramsar site bird features. For the Greater Wash SPA, it was advised that there was insufficient information to rule out likely significant effects (LSE). For the Humber Estuary SAC, it was advised that potential pollution and bentonite breakout impacts meant that LSE could not be ruled out at this stage and further assessment would be required. It was also advised that potential impacts on breeding nightjar associated with Thorne & Hatfield Moors SPA should be assessed, and that further consideration is required for otter and migratory lamprey associated with the River Derwent and Lower Derwent Valley SACs. They requested that potential impact pathways be explicitly assessed, including: • Pollution risks (e.g. surface water run-off from compounds, and bentonite breakout from HDD under the Humber). • Noise impacts (HDD drilling, compounds, borehole works), using a range of measurements compared with background levels and considering “<i>peakiness</i>” and species-specific behavioural responses. • Visual disturbance (particularly to SPA / Ramsar birds on intertidal habitats and mudflats). • Hydrological and physical changes (siltation, abrasion / disturbance of estuarine habitats, potential physical loss of mudflat / estuary habitat, changes in sediment transport). • Assessment of cumulative and seasonal effects and to time works to periods of low bird numbers where practicable. Natural England highlighted that FLL at Drax and surrounding areas must be reassessed with up-to-date data, and that assemblage species for the Lower Derwent Valley SPA should be based on the current WeBS list. They also noted that mitigation and / or seasonal restrictions may be required to avoid peak bird periods. Natural England also advised that the potential for impacts to the Holderness Inshore MCZ should be considered, and it was agreed that a shadow HRA covering the MCZ assessment would be submitted.	Relevant European sites and associated qualifying features have been scoped into the HRA (see Preliminary HRA Report) and assessed as IEFs. The HRA considers noise, visual, pollution and hydrological pathways and assesses site integrity at a feature-specific level. An updated assessment of FLL across the draft Order Limits has been completed using the latest habitat and survey data. Where LSE cannot be excluded, an AA will be undertaken and submitted with the DCO application. Further assessment of otter and migratory lamprey associated with the River Derwent and Lower Derwent Valley SACs has been included in the HRA to address NE’s advice. It is proposed that Thorne & Hatfield Moors SPA be scoped out at all stages of assessment, as no credible impact pathways have been identified; justification is provided in the Preliminary HRA report (and the Ecological Appraisal (Volume 4 - Appendix 7.1)). The Holderness Inshore MCZ has been scoped into the preliminary HRA and will be addressed through a shadow HRA, with results to be submitted alongside the ES.
Habitats, Flora and BNG Natural England advised that the assessment of habitats must be supported by adequate baseline survey data, even where a more strategic, landscape-scale approach is proposed. They noted that LWS may still support protected or priority species, regardless of their condition, and therefore should not be deprioritised for survey or assessment. It was also advised that measures to prevent the spread of INNS should be embedded within the CEMP.	Baseline habitats have been identified through extended UKHab survey and desk study, with detailed methodology provided in the Ecological Appraisal (Volume 4 - Appendix 7.1). Non-statutory sites have been identified and are treated as IEFs where appropriate. Measures set out in the draft CEMP (Volume 4 - Appendix 4.1), including INNS biosecurity, are embedded within the Project and will subsequently be developed into the Outline CEMP to be secured under the DCO and detailed CEMP prepared by the contractor to address this requirement.

Summary of Matters Raised	Response
In relation to BNG, it was highlighted that BNG will apply to NSIPs from May 2026 and should therefore be factored into project planning. They emphasised the importance of aligning proposed mitigation, enhancement and reinstatement measures with future BNG obligations.	BNG delivery will be confirmed in the ES and designed to align with statutory BNG requirements for NSIPs.
Fish Natural England advised that fish surveys and assessments should consider the presence of migratory species, particularly lamprey, and that methodologies should be consistent with best-practice guidance. They advised that eDNA testing alone would not be acceptable for confirming absence of species such as water vole (and by extension noted similar caution for fish surveys), and that traditional survey methods should be followed where appropriate.	Migratory fish species, including lamprey, are scoped in as IEFs. Survey and assessment methodology for fish, as agreed with the Environment Agency, is detailed in Survey Methodology (Volume 4 - Appendix 7.2).
Reptiles Natural England advised that reptile assessment should follow standard guidance and be supported by baseline survey data. They noted that even if habitats are reinstated or enhanced, without survey evidence, the risk remains that species (particularly adders) could be missed. It was also confirmed that avoidance and mitigation measures (e.g. habitat manipulation, translocation) would be expected where suitable habitat is affected.	Survey and assessment methodology is detailed in Survey Methodology (Volume 4 - Appendix 7.2) and follows published guidance. Precautionary working methods and mitigation will be applied to avoid harm during construction. Habitat reinstatement and enhancement measures will ensure a net gain in quality and connectivity of reptile habitat post-construction.
Birds (Wintering, Passage, Breeding) Natural England agreed with the overall scope of wintering bird surveys but advised that data from other NSIPs and existing datasets should be incorporated alongside new survey data. They also highlighted the need to use up-to-date WeBS information to identify assemblage species for the Lower Derwent Valley SPA and to consider use of off-site FLL by these species. For the Greater Wash SPA, Natural England advised that little tern <i>Sternula albifrons</i> and red-throated diver must be considered with reference to conservation advice packages and in-combination effects with nearby NSIPs.	Methodologies for wintering, passage and breeding bird surveys were developed in consultation with Natural England and are detailed in Survey Methodology (Volume 4: Appendix 7.2), with survey results presented in the HRA. Data from relevant NSIPs and published datasets have been incorporated. Birds associated with the Humber Estuary and Lower Derwent Valley SPA and Ramsar sites are scoped in as IEFs and assessed in the HRA, including assemblage species identified in the most recent Natural England guidance. Potential impacts to little tern and red-throated diver will be included in the cumulative assessment when this is developed.
Bats Natural England agreed with a proportionate, landscape-scale approach to bat surveys, based on mapping and valuing potential flightlines and foraging areas and targeting surveys at features with High suitability. They advised that sufficient activity data should be collected to inform the assessment of potential impacts, even where habitat loss is expected to be limited.	Bat survey methodology has been developed in consultation with Natural England and is detailed in Survey Methodology (Volume 4 - Appendix 7.2). The approach combines desk study, habitat valuation, and targeted activity surveys at High suitability features.
Water Vole Natural England advised that eDNA water testing is not acceptable for confirming water vole absence. They stated that traditional field surveys, undertaken in the optimal survey season, are required to provide robust evidence for assessment and any future licensing.	Traditional water vole surveys have been undertaken in line with Natural England's advice, as set out in Survey Methodology (Volume 4 - Appendix 7.2). Appropriate mitigation will be developed where presence is confirmed and results will be presented within the ES.
Badger	Badger surveys have been undertaken to establish baseline conditions, with methodology set out in Survey Methodology (Volume 4 - Appendix 7.2). Badger is scoped in as an IEF and potential impacts will be addressed through the EclA and, where required, licensing with Natural England.

Summary of Matters Raised	Response
Natural England advised that badger should not be scoped out of the EclA. They emphasised the need for baseline survey data to inform both the EclA and any future licence applications, noting that Letters of No Impediment (LONI) require survey evidence.	
Dormouse Natural England asked whether dormouse had been considered. They accepted that the species is not known to occur within the draft Order Limits but advised that a thorough desk study should be used to confirm this.	Dormouse has been scoped out based on desk study evidence confirming absence within the Zol; justification is provided in the Ecological Appraisal (Volume 4 - Appendix 7.1).
Other Matters Raised Natural England advised that potential impacts on existing mitigation areas, such as Newton Garth (Humber Enterprise Park), should be considered, noting their role as compensatory habitat. They also highlighted the importance of considering cumulative and in-combination effects with offshore consents, particularly in relation to little tern and red-throated diver.	Concerns about Newton Garth (Humber Enterprise Park) raised by Natural England were reinforced in discussions with Associated British Ports (see above Summary of Engagement), leading to its inclusion as an IEF within this chapter. Offshore consents and associated issues (e.g. little tern, red-throated diver) will be considered within the cumulative and in-combination assessments presented in the shadow HRA and ES.

7.4 Assessment Methodology

Study Area

- 7.4.1 The CIEEM 2024 guidelines (Ref 7.23) require the assessment to be focused on 'Zones of Influence' (Zol), defined as being the area(s) over which ecological features may be affected by biophysical changes caused by the proposed project and associated activities.
- 7.4.2 The Zol varies between different IEFs and was formalised through professional judgement of perceived impact pathways, best practice guidelines and engagement with stakeholders. The Zol for any IEF may be refined as more information becomes available regarding the potential ecological effects of the Project and through consideration of presence, distribution and abundance of relevant species, habitats or ecosystems. For the purpose of this PEIR, a precautionary Zol has been identified for each IEF and is shown in Table 7-10 and on Volume 3 - Figures 7.1 - 7.3.
- 7.4.3 A wider 15 km buffer was also considered with regard to intertidal and marine receptors due to the influence of coastal process on sediment supply and mobile nature of relevant species. Please refer to Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3) for further detail.

Table 7-10 – Zones of Influence

Important Ecological Feature	Zone of Influence
Internationally and nationally designated nature conservation sites e.g. Special Area of Conservation (SAC), Special Protected Area (SPA), Ramsar sites, National Nature Reserve (NNR), SSSI, Local Nature Reserve (LNR) and Marine Conservation Zone (MCZ)	2 km buffer around the draft Order Limits (extending to 5 km for international sites designated for bats and wintering / passage birds) ⁶ .
Non-statutory designated nature conservation sites, priority habitats (including ancient woodland), protected, notable and invasive non-native species	2 km buffer around the draft Order Limits ² .

⁶ For the ES, a 200 m buffer from the Affected Road Network (ARN) will also be applied where this distance exceeds the current Zol. However, for the PEIR, traffic data screening has not yet been undertaken to determine the ARN for potential air quality impacts (refer to Chapter 6: Air Quality). As a result, additional designated sites and priority habitats may be identified and included when the ARN is defined and reassessed as part of the Environmental ES.

Important Ecological Feature	Zone of Influence
Arboricultural features (e.g. TPOs and veteran trees)	50 m buffer around the draft Order Limits
Mobile marine features (e.g., fish and marine mammal species)	5 km buffer extending from Mean High Water Springs (MHWS)
Intertidal habitats and associated communities	2 km buffer extending from MHWS

Baseline Conditions

Desk Study

- 7.4.4 Baseline conditions of the Project were established during a desk study using the sources detailed in the Ecological Appraisal (Volume 4 - Appendix 7.1).

Site Visits and Surveys

- 7.4.5 Table 7-11 details the surveys that have been (or will be) undertaken to establish the ecological baseline. Specific survey areas were selected based on the desk study and results of the habitat surveys. Please refer to Survey Methodology (Volume 4 - Appendix 7.2) for reasonings behind these choices and for full details on survey methodology.

Table 7-11 – Baseline Surveys

Survey	Date/s of survey	Survey Area	Purpose of survey
Extended UKHab and Hedgerows	Throughout April, May, June, July and August 2025	All accessible land within the draft Order Limits and a 50m buffer zone.	To identify key ecological constraints and form the basis for pre-construction BNG calculations. See the Ecological Appraisal (Volume 4 - Appendix 7.1) for further details and results.
Invertebrates	To be confirmed. Appropriate methods (including timing and number of survey visits) relevant to the taxa and / or habitats under consideration will be adopted, following relevant guidance.	To be informed by the habitat surveys (assessing all accessible land within the draft Order Limits and a 50m buffer zone). The aim is to assess the value of an area of land for invertebrate conservation rather than focusing on individual species presence. Stage 2 would be a targeted invertebrate survey (terrestrial and / or aquatic)	Establish presence and species assemblage in areas of importance (or potential importance) for invertebrates.
Intertidal and Marine	Phase 1 walkover and Phase 2 sampling survey was undertaken in April 2025	Easington Landfall	To establish the intertidal biotopes and presence and assemblages of intertidal species at the Easington Landfall. See Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3) for further details and preliminary results. Final results and the associated survey report will be presented at ES.
Fish	To be confirmed. Surveys are generally recommended from June to September depending on target species. Where present, specific surveys may be required during spawning periods for salmonids (mid-November to the end of January) and Bullhead (February to June).	To be confirmed following a review of existing data and an initial habitat assessment. Will be agreed with the local Environment Agency team.	To obtain data necessary to assess potential likely effects of the Project on fish populations.
Reptiles	Artificial refugia deployment was conducted in April 2025. Surveys were undertaken in April (1), May (2) and June (2).	Six distinct Study Areas across the Project were selected. These can be seen in Appendix 7.2.	Establish presence and species assemblage in areas of importance (or potential importance) for reptiles.
Breeding Birds	Nine transects were surveyed six times at fortnightly intervals between March and June 2025.	Nine distinct areas were surveyed across the Project.	Identify species assemblage in areas of importance (or potential importance) for breeding birds.
Wintering and Passage Birds	Vantage point surveys conducted at high tide every two weeks between August 2024 and May 2025	41 Vantage points were chosen where they met the following criteria (in agreement with Natural England): • Within the draft Order Limits. • Within 4 km Impact Risk Zone (IRZ) of the Humber estuary SPA / Ramsar site. • Suitable habitat for wintering SPA / Ramsar birds (i.e. open agricultural land	Establish the baseline regarding how passage and wintering bird communities utilise the draft Order Limits.

Survey	Date/s of survey	Survey Area	Purpose of survey
Badger	Throughout April, May, June, July and August 2025	All accessible land within the draft Order Limits and a 50m buffer zone.	Establish locations and classifications of badger setts to inform mitigation and / or licensing requirements during construction.
Bat Ground Level Tree Assessments (GLTAs)	Throughout April, May, June, July and August 2025	All accessible land within the draft Order Limits and a 50m buffer zone.	Map the locations of trees with potential roost features (PRFs) within the draft Order Limits.
Bat Roost Verification	Winter to Summer 2025 / 26	Trees and buildings identified with potential roosting features (PRFs) will be subject to further survey	Confirm the presence / likely absence of roosting bats within the draft Order Limits to inform mitigation and / or licensing requirements during construction.
Bat Activity	Spring, Summer and Autumn 2025	Six locations assessed as providing high suitability for commuting and foraging bats were chosen across the Project. These locations were chosen after a review of desk study information and in agreement with Natural England.	Identify species assemblage in areas of importance (or potential importance) for bats.
Otter	First visit conducted between April and June. Second visit conducted between July and September	Watercourses with suitability to support otter and which would potentially be impacted by the Project were identified; 200 m up and downstream of the Project were surveyed. Terrestrial habitats with the suitability to support otter holts, surrounding these suitable watercourses, were also surveyed.	Confirm the presence / likely absence of otter holts and resting sites within the draft Order Limits to inform mitigation and / or licensing requirements during construction.
Water Vole	First visit conducted between April and June. Second visit conducted between July and September	Watercourses with suitability to support water voles and which would potentially be impacted by the Project were identified; 200 m up and downstream of the Project were surveyed.	Confirm the presence / likely absence of water vole within the draft Order Limits to inform mitigation and / or licensing requirements during construction.

Impact Assessment Methodology

- 7.4.6 The EcIA will be undertaken in accordance with the CIEEM Guidelines (Ref 7.23). The CIEEM guidelines represent the current best practice for assessing the ecological impact of development projects.

Determining Importance

- 7.4.7 The CIEEM guidelines (Ref 7.23) state that ecological features (habitats, species, and ecosystems, including ecosystem function and processes) should be considered within a 'defined geographical context' (i.e. spatial scale) and recommends the following frame of reference:
- International and European.
 - National.
 - Regional.
 - Metropolitan, County, vice-county or other Local Authority-wide area.
 - River Basin District.
 - Estuarine system / Coastal cell.
 - Local.
- 7.4.8 Assigning importance to ecological features is based on professional judgement informed by available guidance and information and (where necessary) expert advice.
- 7.4.9 Those ecological features of sufficient value to be considered in decision-making (i.e. those considered to be of 'Local' importance or above), and which it is considered could experience significant effects as a result of the Project (i.e. effects that could adversely affect the integrity of the habitat or the favourable conservation status of a species' population), will be classified as IEFs and thus will be considered in the detailed assessment as outlined in the CIEEM guidelines (Ref 7.23). Other ecological features (i.e. those which are of less than 'Local' importance) will be scoped out, and not subject to any further assessment within the impact assessment.
- 7.4.10 In accordance with the CIEEM guidelines, where there is the potential for a breach of legislation in relation to protected species (regardless of their importance), those species are also considered an IEF.
- 7.4.11 Following identification and valuation of the IEF, it is then necessary to investigate potential impacts on those features to understand how they might be affected by the Project.

Characterising Effects

- 7.4.12 The EclA will be based on an understanding of the likely activities associated with the Project, the biophysical changes that are predicted as a result of these activities and the area over which such effects might be experienced by different IEFs.
- 7.4.13 When describing ecological impacts and effects, reference will be made to the following characteristics:
- Positive or negative.
 - Extent.
 - Magnitude.
 - Duration (assessed as either 'short-term' (up to 1 year), 'medium-term' (1-10 years) or 'long-term' (greater than 10 years)).
 - Frequency and timing.
 - Reversibility.

Significance Criteria

- 7.4.14 The assessment of likely significant environmental effects as a result of the Project will consider the construction, operational and decommissioning phases.
- 7.4.15 The assessment of significant effects on IEFs will be made using:
- Consideration of best practice / guidance.
 - Professional judgement.
 - Consideration of the baseline information obtained, the Project details and comments raised through stakeholder engagement.
 - Prediction of potential effects based on baseline information and the Project details.
 - Quantification of potential effects.
 - Identification of appropriate mitigation measures.
 - Prediction of residual effects based on baseline information, the Project details and mitigation measures.
- 7.4.16 The significance of an effect on an IEF will be determined following an analysis of the factors that characterise the effect. The CIEEM guidelines (Ref 7.23) define significant effects as those that:

‘...either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general... In broad terms,

significant effects encompass impacts on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).'

- 7.4.17 Significant effects, as defined by the CIEEM guidelines (Ref 7.23), are determined by assessing any deviation in baseline conditions of an IEF that may occur as a result of individual and cumulative impacts during the construction, operational and decommissioning phases of the Project.
- 7.4.18 Significance will be determined on the basis of a likely effect on the integrity or favourable conservation status of a feature, at a given geographic scale. The geographical scale at which an effect is significant can vary from the geographical importance of the ecological feature being assessed and in accordance with the CIEEM guidelines (Ref 7.23), and this will be a function of the assessment.

Assumptions and Limitations

- 7.4.19 The impact assessment will be based on the likely ecological conditions at the time of construction, operation and decommissioning.
- 7.4.20 Baseline surveys and assessments have been or will be implemented as per those described within the Ecological Appraisal (Volume 4 - Appendix 7.1), Survey Methodology (Volume 4 - Appendix 7.2) and Chapter 20: Coastal Processes, unless otherwise agreed with relevant stakeholders.
- 7.4.21 Ecology surveys are ongoing, with further survey and assessment work scheduled for in advance of submitting the DCO application. This PEIR has been prepared on the basis of survey results accrued to date. Results provided within the final ES may differ to those presented here.
- 7.4.22 Private residential and industrial land has not been surveyed in detail as it is assumed these areas will be excluded from development.
- 7.4.23 Land access to the entire draft Order Limits has not yet been granted (see Volume 3 - Figure 7.4 in for the area currently not accessible and assessed using desk-based information only).

7.5 Baseline Conditions

Existing Baseline

7.5.1 Baseline conditions are presented in the Ecological Appraisal (Volume 4 - Appendix 7.1) and Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3) reports. Where applicable, these appendices also provide justification for excluding certain IEFs from further assessment due to the absence of a perceivable impact pathway. A summary of IEFs taken forward for assessment is provided in Table 7-12. The location of all designated sites and habitat-related IEFs within the relevant ZOI is shown in the following figures:

- Volume 3 – Figure 7.1: Designated Sites.
- Volume 3 – Figure 7.2: Non-statutory Designated Sites.
- Volume 3 – Figure 7.3: Priority Habitats, Ancient Woodland and Arboricultural Features.
- Volume 3 – Figure 7.4: UKHabs Plan.

Table 7-12 – Baseline and Determination of IEFs

IEF	Baseline	Importance
Humber Estuary Corridor	The draft Order Limits extend across the Humber Estuary Corridor, which is designated as a SAC, SPA, Ramsar site and SSSI (and includes sections of the Rivers Trent and Ouse). These sites include marine components and have a shared boundary within the draft Order Limits. This IEF also includes North Killingholme Haven Pits SSSI, Asselby Island LWS, Alkborough Flats LWS, Dawson City Claypits LWS, East Marsh LWS, Halton Marsh Clay Pits LWS, Killingholme Haven Pits LWS, Paull Holme Strays LWS and Halton Marshes. Features include coastal and wetland habitats, vascular plants, invertebrates, marine mammals, fish, and passage, breeding and non-breeding birds.	International
Holderness Coast	The draft Order Limits terminate at the Holderness Coast, extending into the sea to Mean Low Water Springs (MLWS). This IEF includes the intertidal and marine components of the Holderness Coast, sections of which are designated as the Greater Wash SPA (marine) and Holderness Inshore MCZ. Features include habitats, invertebrates (crustaceans, molluscs), algae, sponges and other fauna, including fish, and passage, breeding and non-breeding birds. There is further potential for interaction with other marine species, including marine mammals, due to underwater noise and impacts associated with construction activities. Potential impacts to additional designated sites and receptors off the Holderness Coast will be explored in more detail within the ES. The supporting baseline is presented in Volume 4 - Appendix 7.3 – Intertidal Desk Based Assessment. An assessment on Dimlington Cliffs SSSI will be presented within Chapter 10: Ground Conditions and Hydrogeology and Chapter 20 Coastal Processes where relevant.	International
River Derwent Corridor	Situated upstream and approximately 0.5 km north of the draft Order Limits, but dependent on the Humber Estuary (which is crossed by the Project). Designated a SAC and SSSI, the IEF also includes the Lower Derwent Valley SPA, Ramsar site and NNR. Features include habitats, aquatic plants and a diverse range of fauna, including invertebrates, fish, otter and passage, breeding and non-breeding birds.	International
Eskamhorn Meadows SSSI	Situated adjacent to the draft Order Limits. Designated for habitats, vascular plants and breeding birds.	National
Eastoft Meadow SSSI	Situated approximately 290 m west of the draft Order Limits. Designated for habitats and vascular plants.	National
The Lagoons SSSI	Situated approximately 1.8 km south of the draft Order Limits. Designated for nationally scarce flora and invertebrates, characteristic of coastal saline water habitats, and a variety of migratory and wintering birds.	National
Other non-statutory designated sites situated within the draft Order Limits	Hedon - Winestead Disused Railway Line LWS, Hodgson's Fields LWS, Ancholme Fields LWS, Barton Road, Wootton Hall LWS, Chase Hill Wood LWS, East Drain, South Ferriby LWS, Hatfield Waste Drain LWS, Keadby Boundary Drain LWS, Keadby Warping Drain LWS, New River Ancholme LWS, Paupers' Drain LWS, Stainforth and Keadby Canal Corridor LWS, Thornton Curtis Chalk Pit Road Verge LWS, Whiting Mill Bottom Road Verges LWS.	County
Other non-statutory designated sites situated outside the draft Order Limits but with a potential impact pathway	Burkinshaw's Covert LWS; Clough Plantation LWS; Enholmes Plantations LWS; Frodingham – Winestead Lane LWS; Keadby Wet Grassland LWS; Keadby Wetland LWS; Kelsey Hill Gravel Pits Historic LWS; North Engine Drain; Oak Hill LWS; Out Newton – Skeffling LWS; Patrington Haven Drain LWS; River Torne LWS; South Cloister Covert LWS; Belton LWS; South Soak Drain, Keaby LWS; Swinster Lane Field LWS and Three Rivers LWS Oak Hill LWS, Mayflower Wood Meadow LWS, Keadby Wet Grassland LWS, Keadby Wetland LWS, Three Rivers LWS, Folly Drain North LWS, River Torne LWS, North Engine Drain, Belton LWS, South Engine	County

IEF	Baseline	Importance
	Drain, Belton LWS, Gunness Common LWS, Abbot's Lodge Grassland LWS, South Cloister Covert LWS, Hollym Carrs LWS, Weldon's Plantation LWS, Enholmes Plantations Historic LWS, Fort Paull Humber Grassland Candidate LWS, Brockholes SINC, Newland Ings, Newland SINC, Out Newton – Skeffling LWS, Thealby Gullet LWS, Patrinton Haven Drain Candidate LWS, Goxhill Marsh South LWS, South Soak Drain, Keadby LWS, Leggott's Quarry LWS and Manor House Farm Field LWS. Oak Hill LWS, Mayflower Wood Meadow LWS, Keadby Wet Grassland LWS, Keadby Wetland LWS, Three Rivers LWS, Folly Drain North LWS, River Torne LWS, North Engine Drain, Belton LWS, South Engine Drain, Belton LWS, Gunness Common LWS, Abbot's Lodge Grassland LWS, South Cloister Covert LWS, Hollym Carrs LWS, Weldon's Plantation LWS, Enholmes Plantations Historic LWS, Fort Paull Humber Grassland Candidate LWS, Brockholes SINC, Newland Ings, Newland SINC, Out Newton – Skeffling LWS, Thealby Gullet LWS, Patrinton Haven Drain Candidate LWS, Goxhill Marsh South LWS, South Soak Drain, Keadby LWS, Leggott's Quarry LWS and Manor House Farm Field LWS.	
Other notable sites	Keadby Ash Tip and Newton Garth are partially overlapped by the draft Order Limits and are of ecological value due to the habitat types they support and the associated species assemblages. These sites contribute to local biodiversity through the presence of open mosaic habitats, grassland, and wetland features, which provide foraging, breeding, and shelter opportunities for a range of flora and fauna. The draft Order Limits intersect sections of the River Ouse and River Aire. While these rivers are not designated sites, they are ecologically important riparian corridors that functionally connect with the Humber Estuary Corridor and River Derwent Corridor IEFs.	Up to National
Terrestrial and Freshwater Habitats (including recognised areas of priority habitat) situated outside of the above IEFs	The habitats within the draft Order Limits are predominantly composed of arable land and grazed pasture fields, typically bordered by ditches and / or hedgerows, some of which qualify as 'Important' under the Hedgerows Regulations 1997. The draft Order Limits intersect several watercourses, the most ecologically significant of which are identified within the IEFs listed above. For a comprehensive list of all watercourses crossed, refer to Chapter 18: Hydrology and Land Drainage - Section 18.5. Small, scattered blocks of woodland are also present but occur infrequently across the draft Order Limits. Recognised areas of priority habitat situated within the draft Order Limits (but outside the above IEFs) include: coastal and floodplain grazing marsh, coastal saltmarsh, deciduous woodland, good quality semi-improved grassland, lowland calcareous grassland, lowland dry acid grassland, lowland fens, maritime cliff and slope, mudflats, reedbeds, saline lagoons and traditional orchard. These areas are shown on Volume 3 - Figure 7.3. Additional habitats recorded within the draft Order Limits are described in the Ecological Appraisal (Volume 4 - Appendix 7.1) and mapped on Volume 3 - Figure 7.4.	Negligible to County
Arboricultural features (TPOs and veteran trees)	A number of TPOs been identified within 50 m of the draft Order Limits, comprising of a combination of woodland or group designations and individual trees. These features are shown in Volume 3 - Figure 7.3. While existing veteran tree records indicate that no confirmed veteran trees are present within the draft Order Limits, several potential veteran trees were identified during the UKHab survey. These features will be further assessed, and the results will be presented in the ES.	Local (for TPO's, any veteran trees would be regional)
Notable plants and INNS	Notable plants have been identified within the draft Order Limits, typically associated with the recognised areas of priority habitat and / or the above mentioned IEFs. Occasional stands of INNS are present throughout the draft Order Limits ⁷ .	Up to County

⁷ Importance of INNS is N/A and has been included here for legislative purposes only.

IEF	Baseline	Importance
Invertebrates	Habitats within the draft Order Limits are largely unsuitable for notable invertebrates (aquatic and terrestrial); however, notable terrestrial and aquatic invertebrates are located within the Zol within distinct habitat patches and intermittent pockets of suitable habitat, typically associated with the recognised areas of priority habitat and / or the above mentioned IEFs.	Up to Regional
Fish	This IEF excludes fish associated with IEFs noted above. The draft Order Limits extend across several watercourses of varying size and records exist of protected and notable records of fish species within the Zol.	Up to Regional
Amphibians	Terrestrial habitats within the draft Order Limits are largely unsuitable for amphibians and limited to field margins and rank semi-natural habitat e.g. rough grassland and scrub; however, amphibians, including GCN and common toad (<i>Bufo bufo</i>), are widespread and localised, supported in aquatic habitats such as ponds and wetlands.	Up to Regional
Reptiles	Habitats within the draft Order Limits are largely unsuitable for reptiles; however, distinct habitat patches and intermittent pockets of habitat suitable for viviparous lizard (<i>Zootoca vivipara</i>), slow worm (<i>Anguis fragilis</i>) and grass snake (<i>Natrix helvetica</i>) are sporadically distributed across the area. These are largely associated with linear features (such as railway / roadside embankments / verges, hedgerows and water features) and a few areas of rank semi-natural habitat, for example, rough grassland and scrub.	Up to County
Birds	This IEF excludes birds associated with IEFs noted above. Much of the habitat within the draft Order Limits has the potential to support passage, wintering and / or breeding birds, particularly those associated with farmland and intertidal habitat.	Up to County
Badger	Desk study and incidental field observations have confirmed that badger (including the presence of multiple setts) are widespread throughout the draft Order Limits and local area.	Less than Local
Bats	Several features have been identified within the draft Order Limits which may provide suitable habitat for roosting, foraging and commuting bats. Desk study data suggests that although a diverse assemblage of bat species (10 species identified) are present within the wider Zol, low numbers of mainly common and widespread bat species are found in the draft Order Limits.	Up to Regional
Otter	Desk study and field survey observations have confirmed that otter are widespread throughout the draft Order Limits and wider Zol, predominantly associated with the larger riparian corridors such as the River Ouse, Dutch River, River Trent, Skegger Beck and the Humber Estuary.	Up to Regional
Water vole	Desk study and field survey observations have confirmed that water vole are widespread throughout the draft Order Limits and local area, with a high concentration of records near to Drax, Crowle, Keadby and Paull Holme.	Up to County
Marine mammals	Both grey seal (<i>Halichoerus grypus</i>) and harbour seal (<i>Phoca vitulina</i>) are known to be present within the Humber Estuary Corridor; however, their presence within or beyond the draft Order Limits is considered rare. Occasional records exist for both species within the tidal River Trent, but such sightings are infrequent and typically transitory, reflecting short-term or incidental use rather than regular presence. Occasional records of harbour porpoise (<i>Phocoena phocoena</i>) are further noted within the Humber Estuary and tidal River Trent, albeit rare. The noted marine mammals may further overlap with the Study Area at the Easington landfall point, amongst other species recorded more widely within the North Sea.	Up to Regional
Other notable mammals	Other relevant notable mammals include brown hare (<i>Lepus europaeus</i>) and hedgehog (<i>Erinaceus europaeus</i>) which are widespread throughout the draft Order Limits and local area. Low numbers of harvest mouse (<i>Micromys minutus</i>) were also identified within the search area. Records within the draft Order Limits were associated with Three Rivers LWS and Burkinshaw's Covert LWS.	Less than Local

Future Baseline

- 7.5.2 In the event the Project does not proceed, it is considered likely that terrestrial habitats within the draft Order Limits would remain broadly similar to those of the current baseline. The predominant land use is agricultural, and unless current agricultural or other land management practices cease, ecological conditions are unlikely to change significantly. Where management does cease, natural habitat succession would be expected.
- 7.5.3 It is reasonable to assume that, if the Project does not proceed and current conditions are maintained, the abundance and distribution of species within the draft Order Limits would remain largely unchanged. In the long term it is possible that the range of some terrestrial species may be altered due to climate change, though this is unlikely within the lifetime of the Project.
- 7.5.4 The open mosaic habitat at Keadby Ash Tip does not appear to be subject to active management and, as an early successional habitat, is likely to undergo transition over time, becoming increasingly dominated by ruderal vegetation, scrub, and eventually developing woodland.
- 7.5.5 Conversely, Thorn Marsh Farm is currently managed as agricultural land but is expected to be converted to marshy grazed grassland to support ecological mitigation associated with the second phase of the Yorkshire Energy Park. This habitat transition is likely to proceed irrespective of the Project timeline, subject to delivery of that development.
- 7.5.6 Future development within the draft Order Limits is likely to be limited given the predominantly rural character of the area. Any development is expected to be localised and related to industrial or infrastructure expansion, particularly in areas adjacent to existing settlements such as Scunthorpe and Immingham.
- 7.5.7 In the context of the marine and intertidal environment, there are several areas of consideration for detailing a description of the future baseline's anticipated evolution within the Project area, these include:
- Rising Sea Levels: Mean sea levels are projected to rise due to climate change, which will dominate future extreme water levels. Historic sea level rise in the Humber Estuary area is documented, with allowances provided by the Environment Agency for future planning.
 - Coastal Erosion: Rising sea levels and increased storm frequency will likely accelerate coastal erosion, especially along the Holderness coast. Please refer to Chapter 20: Coastal Processes for more detail.

- **Cliff and Shore Platform Changes:** Cliff and shore platform erosion rates near Easington have been investigated in recent studies, with cliff recession rates reportedly increasing in recent years. The shore platform is expected to lower by up to 3.3 m over the next 50 years due to rising sea levels. Please refer to Chapter 20: Coastal Processes for more detail.
- **Industrialisation / Human Population:** Increased industrialisation and anthropogenic use of the environment may result in increased pressure on natural resources, and a degradation of current conditions. Habitat fragmentation and reduced water quality are such examples of issues with potential to arise from these factors.

7.5.8 Specifically, with projected sea-level rise and coastal erosion there will likely be more substantial coastal recession, habitat loss, and changes in sediment distribution along the Holderness Coast, and Humber and the tidal reach of the River Trent. Such processes are already ongoing and are expected to continue over the coming decades. Within the anticipated lifetime of the Project, the scale of change is projected to be gradual rather than abrupt, though cumulative recession may alter the position of the shoreline and affect intertidal morphology near the landfall site. These changes could influence ecological stability in the longer term and will be considered (within the ES) in the context of existing shoreline management and monitoring programmes.

7.5.9 In addition, hydrological conditions along the Holderness Coast and in the Humber and tidal River Trent are expected to evolve due to sea-level rise, increased storm surges, and changing precipitation patterns. While such changes are expected to manifest progressively over the coming decades, they may result in more frequent tidal inundation and potentially larger tidal ranges within the operational lifetime of the Project. This could affect sediment stability, water quality, and habitat conditions in the intertidal area over time. Increased storm surge frequency is more likely to have implications in the medium-to-long term, contributing to saltwater intrusion and altered salinity gradients upstream with consequent effects on estuarine habitats, species composition, and ecosystem productivity. These considerations will be revisited in the ES, with reference to relevant climate projections within the Project's design horizon.

7.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 7.6.1 A hierarchical approach to mitigation is being adopted through Project design which seeks to avoid adverse impacts on IEFs in the first instance through an iterative approach to design, e.g. informing alignment to avoid sensitive receptors where possible. In areas where avoidance is not possible, measures will be implemented to prevent or reduce potentially significant negative effects. Where residual effects remain, measures to compensate against negative effects may also be required. This may include habitat creation to offset impacts associated with habitat loss and fragmentation where these cannot be avoided.
- 7.6.2 Where known at the current stage of design, details have been provided below with respect to design, mitigation and enhancement measures. It is important to note that these should be treated as preliminary and are likely to evolve as the design develops.
- 7.6.3 Mitigation measures are undertaken as a response to anticipated adverse effects and can be described as:
- **Primary mitigation** – modifications to the location or design made during the design phase that are an inherent part of the Project.
 - Secondary mitigation – commitments made by the Applicant that will require further activity to achieve the anticipated outcome. The effectiveness of such measures will be assessed within the ES and the commitment to delivering the mitigation measure will be secured by the DCO (or other suitable mechanism).
 - 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 practices used to manage commonly occurring environmental effects. These measures are treated as an inherent part of the Project and, where appropriate, will be set out in the management plans that will accompany the ES, such as those detailed within the draft CEMP (Volume 4 - Appendix 4.1) that will subsequently be developed into the Outline CEMP to be secured under the DCO and detailed CEMP prepared by the contractor.
- 7.6.4 Based on the survey and assessment work undertaken to date (which will be subject to further refinement in the ES), a range of measures have been

identified to reduce potential adverse effects. These include avoidance, mitigation, and compensation measures implemented at the design stage (collectively referred to as 'embedded mitigation') and comprise both primary and tertiary mitigation measures.

- 7.6.5 Primary and tertiary mitigation measures are outlined below. Secondary mitigation measures, which may be required to address residual impacts identified through the assessment process, are described in Section 7.8, along with proposed biodiversity enhancement measures.

Embedded Mitigation

- 7.6.6 Primary mitigation measures associated with the Project include consideration of the identified IEFs (and any additional ones identified through further site investigation / survey) to inform the selection and appraisal of Project options, and the methods used during construction. The draft Order Limits were developed through this process, and its route has been carefully chosen to avoid sensitive IEFs (such as, for example, the avoidance of ancient woodland) and to target open agricultural habitats. Primary mitigation measures relating to Project design are detailed within Chapter 3 - Consideration of Alternatives.
- 7.6.7 The direct impacts of the Project include the clearance of habitats for construction (e.g. reduction of habitat size and fragmentation). In the first instance, impact avoidance measures have been (and will continue to be) employed throughout the design of the Project. This has included avoidance of statutory and non-statutory designated sites, priority habitats, woodlands and water features. This will be developed further through field surveys, micro-siting the route and / or using trenchless techniques in some circumstances to avoid / minimise losses of higher quality habitat.
- 7.6.8 At this stage, the baseline conditions are not fully understood, and thus tertiary mitigation is limited. However, mitigation, compensation and enhancement measures are likely to be required in relation to relevant policies, the legal protection afforded to certain species and to ensure that INNS are not spread as a result of the Project. Full details of all tertiary or essential mitigation measures, along with the mechanism for delivery, will be provided within the ES.
- 7.6.9 Construction and de-commissioning impacts would be designed out / minimised as far as possible through, for example, minimising land-take / habitat loss and locating access tracks / haul roads and site compound / material storage areas outside of ecologically sensitive sites / habitats (such as statutory and non-

statutory designated sites and priority habitats). Clearly demarcated, dedicated access routes would be provided during construction / de-commissioning and any areas required for temporary works would be reinstated on completion.

- 7.6.10 The Ecology and Biodiversity assessment will rely on commitments 1 and 2 (relevant to various environmental topics) outlined in the draft Register of Commitments in Volume 4 - Appendix 4.2: Draft Register of Environmental Actions and Commitments, which include the development of a CEMP and DEMP using best environmental practice techniques.
- 7.6.11 Table 7-13 sets out how direct impacts have been avoided or minimised through the incorporation of embedded mitigation measures during project design and planning. This embedded mitigation (primary and tertiary), which includes the implementation of DLL, is considered satisfactory for the following IEFs: amphibians (including but not limited to GCN) and 'other notable mammals' (i.e. brown hare, hedgehog and harvest mouse). No specific mitigation measures are required for these IEFs and they are not considered further within this report.

Table 7-13 – Embedded mitigation

Ref	Measure	Project phase	Responsible party
ECO1	As per Chapter 10: Ground Conditions and Hydrogeology, trenchless crossings will be employed at the following watercourses: • River Ouse • River Aire • Aire and Calder Navigation • Dutch River • River Trent • Halton Drain • New River Ancholme • East Halton Beck • River Humber • Winestead Drain It is currently understood that trenchless crossings would also be employed to avoid direct impacts on the following IEF's: Humber Estuary Corridor, Holderness Coast, Hedon-Winestead Disused Railway Line LWS, Winterton Beck, West Drain, Weir Dike / East Drain, Paull Holme Strays LWS, coastal saltmarsh, mudflats and lowland fens; and some of the following habitats: lowland calcareous grassland, deciduous woodland, hedgerows (including Important hedgerows), unnamed ditches / drains and roadside verges. Following review of survey data, in response to consultation and as design develops, the use of trenchless crossings may be adopted at additional IEFs.	Construction	Designer / Contractor
ECO2	Route alignment to minimise impact. Avoidance of construction within designated wet grassland area. Micro-siting to avoid surface hydrology features.	Construction	Contractor
ECO3	Avoidance of open mosaic habitat where feasible. Habitat change monitoring and pre-construction surveys if impacted.	Pre-construction / Construction / Decommission	Contractor
ECO4	Avoidance of known high-use SPA supporting habitat. Timing of works to avoid peak use by non-breeding waterbirds.	Construction / Decommission	Contractor
ECO5	Construction Exclusion Zones (CEZs) will be established prior to construction to define working areas and protect retained habitats. A minimum buffer of 10 m (where practicable) would be retained around IEFs to reduce any potential direct or indirect impacts on the species and habitats associated with them and the CEZ may need to be extended beyond 10 m for certain IEFs, such as woodlands and trees, for example for root protection zones. The location of CEZs will be informed by a pre-construction / pre-decommissioning ecological walkover (to identify any changes to the baseline) and a tree survey (to British Standard BS 5837:2012 (Ref 7.25)).	Construction / Decommission	Contractor
ECO6	A Pollution Control Plan will be implemented during construction, including best practice drainage and pollution prevention measures in accordance with CIRIA guidance. Any in-channel works will be carried out under an approved method statement and undertaken sensitively to minimise ecological impact.	Construction / Decommission	Contractor
ECO7	A method statement will be developed to ensure flumes used during open-cut crossings allow continued passage of aquatic and semi-aquatic species (e.g. otter, water vole, fish), including dry access routes where practicable. In-channel works may be supported by	Construction	Contractor

Ref	Measure	Project phase	Responsible party
	cofferdams, and fish rescue operations (under Environment Agency licence) will be undertaken using stop nets and electric fishing, with rescued fish released downstream. Open-cut activities will be kept to the minimum practicable duration.		
ECO8	Retention where possible. Compensatory planting using native species where partial removal is unavoidable.	Construction / Restoration	Contractor
ECO9	Where avoidance is not possible, minimise construction footprint by crossing features perpendicular to their alignment, using existing gaps in vegetation, and avoiding mature trees and meanders or widened sections. Removal limited to minimum length required. Reinstatement to include species-rich planting with native species appropriate to local landscape character. Controls to be set out in the Biodiversity Management Strategy.	Construction	Contractor
ECO10	Micro-siting to avoid woodland blocks, individual mature trees and TPOs, supported by arboricultural input. Where avoidance is not possible, impacts will be minimised and compensatory planting provided. Controls to be set out in the Biodiversity Management Strategy. Where potential ancient or veteran trees are identified, further arboricultural verification will inform appropriate protection measures. Where tree surgery to the crown or roots is necessary, this would be undertaken in accordance with BS 3998:2010 (Ref 7.26); however, the Project, and specific construction tasks, would aim to retain as many trees as possible.	Design / Construction	Contractor
ECO11	Biosecurity measures to prevent the spread of INNS and toolbox talks where relevant. As per the draft CEMP (Volume 4 - Appendix 4.1), which will be further developed into an Outline CEMP for submission with the DCO and subsequently into a detailed CEMP prepared by the appointed contractor.	Construction / Decommission	Contractor
ECO12	Sediment and pollution control measures (e.g. silt fencing, cut-off ditches, fuel spill kits) to be implemented near watercourses and retained vegetation. Lighting, noise and dust emissions to be minimised near sensitive receptors. Lighting will be directional and switched off when not in use to avoid spill onto habitats. Such measures are included within the draft CEMP (Volume 4 - Appendix 4.1), which will be further developed into an Outline CEMP for submission with the DCO and subsequently into a detailed CEMP prepared by the appointed contractor.	Construction / Decommission	Contractor
ECO13	The locations of AGIs and the Pump Facility have already been selected to avoid the most sensitive IEFs, while the positioning of other permanent infrastructure will be refined, where feasible, through detailed design and consultation with ecological specialists to further minimise impacts on IEFs.	Pre-construction	Design team
ECO14	If required, where adverse effects cannot be ruled out, the Project will only proceed under a Natural England licence, secured prior to works affecting the protected species (under advice from ECoW / licensed ecologist). Where impacts on IEFs / protected species cannot be avoided, precautionary working methods will be adopted, including phased vegetation clearance and timing restrictions. Precautionary working methods would include, but not be limited to: • Avoidance of habitat disturbance / destruction where feasible. Avoidance of ground disturbance of wetland priority habitats in wintering bird season (Oct–Mar). • Vegetation clearance will be scheduled outside the bird breeding season where possible. Where clearance during the breeding season is unavoidable, affected vegetation will be checked by an ECoW within 48 hours of works. Exclusion zones would be implemented where active nests are found and adhered to until an ecologist confirms the nest is no longer in use. • Excavations will either be closed overnight or be battered, ramped or secured with barriers to prevent wildlife entrapment.	Pre-construction / Construction / Decommission	Contractor

Ref	Measure	Project phase	Responsible party
	An ECoW will supervise works in sensitive areas, ensure implementation of mitigation measures, and provide toolbox talks to site personnel.		
ECO15	Mitigation for GCN will be delivered through the DLL scheme, approved by Natural England. Implementation of the DLL will be undertaken in accordance with the scheme's requirements / under the direction of Natural England.	Pre-construction / Construction / Decommission	Contractor
ECO16	All temporary works areas will be reinstated to at least baseline condition or enhanced to improve ecological value (e.g. hedgerow species diversity). Accordingly, sections of hedgerow scheduled for removal during construction would be reinstated and, where appropriate, would be improved from their baseline condition e.g. defunct or species-poor hedgerows would be replanted so as to achieve species-rich and continuous hedgerows, once re-established.	Post-construction / Decommission	Contractor
ECO17	BNG will be delivered in accordance with the emerging policy context and forthcoming Government guidance for NSIPs.	Post-construction	Contractor
ECO18	Pipeline to be installed using largely trenchless methods, where practicable, where these IEFs could be impacted. If practicable, vibratory piling to be used over impact piling for the installation of the cofferdam at the Easington landfall if required.	Construction	Contractor
ECO19	Pipeline to be installed using largely trenchless methods where these IEFs could be impacted. Pipeline to be adequately buried below the predicted cliff line at the landfall and below the seabed profile throughout its design life (25 years).	Construction	Design team / Contractor
ECO20	The cofferdam, if selected as the cliff crossing methodology, and other associated infrastructure will be present for as short a time as reasonably practicable during construction. Pipeline route optimisation in the nearshore will be conducted where reasonably practicable to minimise impacts on IEFs. Following pipeline installation, it will be buried using excavated material and the beach will be reinstated to pre-construction condition.	Construction	Developer / Contractor

7.7 Preliminary Assessment of Potential Impacts

- 7.7.1 This section details the preliminary assessment of potential impacts for the Project during construction, operation and decommissioning phases.
- 7.7.2 As a largely below-ground development (excluding AGIs and the Pump Facility), the Project will result in predominantly short-term and temporary impacts during construction. As such the majority of IEFs will only be subject to potential effects during construction. Operational effects are considered to be limited to AGI locations and the Pump Facility only and are considered unlikely to be significant. However, at the time of writing, lighting, noise and vibration disturbances upon IEFs from the AGIs and the Pump Facility have not been quantified and have therefore been scoped in for further assessment.
- 7.7.3 Further, the assessment does not take account of specific mitigation measures that will be developed as impacts are better understood; this is particularly relevant to fragmentation effects and potential changes to air quality and hydrological conditions. The ES will incorporate the recommendations of the other relevant environmental topics to inform a thorough solution.
- 7.7.4 With regard to the intertidal and marine environment, impacts are discussed below in relation to the Study Area. Impacts are foreseen to be largely localised, associated with habitat disturbance due to pipeline installation activities. There may be further risk to noise and vibration-sensitive species consequent of underwater noise associated with piling and other installation activities.

Construction

- 7.7.5 Impacts associated with construction have been separated into two categories: land take (permanent and temporary) and pollution risk.

Land Take (Permanent and Temporary)

- 7.7.6 Impacts from land take are anticipated across IEFs within the draft Order Limits and include direct physical habitat loss which could result in harm or mortality of individual organisms, and indirect impacts (including fragmentation and reduction / loss of IEF quality or function). Indirect impacts could also be felt on IEFs situated outside of the draft Order Limits where they are connected to / dependent on IEFs within the draft Order Limits.
- 7.7.7 Impacts from land take will be largely temporary (with permanent land take associated with AGIs and Pump Facility only). Nevertheless, as the majority of

the route passes through intensively managed agricultural land, impacts on habitats in these areas are expected to be minimal given the regular cycle of ploughing and cultivation. It is acknowledged, however, that the temporal effects of temporary habitat loss will vary for different IEFs (i.e. how long the reinstated IEF / habitat takes to establish and reach the target condition will vary significantly).

7.7.8 Specific impacts from land take include:

- It is presently assumed that trenchless techniques will be employed for the majority of the installation works associated with the pipeline at its landfall location (the exception being the potential for an open cut cofferdam installation across the foreshore at the Easington landfall). There may be localised direct loss of habitat associated with this in the immediate footprint of the pipeline.
- Installation works may also cause temporary resuspension of sediments that may trigger smothering of habitats and associated species within the Zol. Such localised habitat loss and associated disturbance will occur within the Humber Estuary SAC / SPA / Ramsar / SSSI, Greater Wash SPA and Holderness Coast (including the MCZ). No impacts are expected associated with rock placement or scour due to sufficient burial of the pipeline being assumed and therefore no requirement for rock placement envisaged.
- Loss and disturbance of land that is functionally linked to IEFs, notably land used by the birds associated with the Humber Estuary.
- An open-cut technique will be used to cross a number of watercourses. Similarly, there are areas of recognised priority habitats within the draft Order Limits where habitat loss and / or fragmentation may occur. Open-cut construction will also result in direct impacts to a large number of hedgerows (including “Important” hedgerows).
- Works to install pipelines below IEFs (i.e. trenchless techniques) could lead to significant vibration or loading that could adversely impact the stability of the IEF.
- Impacts to notable plants, intertidal and subtidal infauna, fish and shellfish, invertebrates (aquatic and terrestrial), reptiles, birds (passage, wintering and breeding) and mammals (marine mammals, badger, bats, otter and water vole), could also occur from habitats loss, fragmentation, disturbance, and direct harm / mortality of individuals.

Pollution Risk

- 7.7.9 Direct and indirect impacts associated with pollution are of relevance to all IEFs and include:
- Construction pollution (e.g. sediment run-off / silt dispersal / fuel or chemical spill) or discharge of sediment / slurry / drilling fluid during trenchless construction, including potential for dispersal downstream (in the event of discharge to a watercourse).
 - Other pollution impacts (such as dust, noise (including underwater noise), lighting, vibration and visual).
 - Increased deposition of nitrogen and other airborne pollutants during the construction period due to a deterioration in air quality from plant / vehicle emissions and increased traffic volumes on the affected road network.
 - Causing the spread / introduction of INNS.
- 7.7.10 Such events could cause direct disturbance leading to reduction, loss (of habitat and function) and / or fragmentation of habitat IEFs within the draft Order Limits. Indirect impacts could also be felt on IEFs situated outside of the draft Order Limits where they are hydrologically connected to or dependent on IEFs within the draft Order Limits and / or are connected to the affected road network. For example, a pollution event during construction impacting the Humber Estuary would not directly affect the River Derwent. However, there could be indirect effects on migratory species such as lamprey, which move through the Humber to reach spawning habitats in the Derwent.
- 7.7.11 With regards to flora and fauna, such events could cause disturbance, harm and mortality which for fauna could result in changes in behaviour, reduced fitness and abandonment of features upon which they are reliant.
- 7.7.12 With regard to underwater noise and disturbance, impacts are expected to be minimal, temporary and of short duration during construction. Noise-sensitive receptors such as marine mammals, fish and some diving seabirds may be affected by underwater noise and associated disturbance. A detailed underwater noise assessment will be undertaken for relevant estuarine and coastal crossings and will draw on existing modelling to inform the ES (see Intertidal Environment and Marine Ecology, Volume 4 - Appendix 7.3). The design of landfall works, including use of trenchless techniques and beach profile reinstatement, will also be informed by coastal process assessments (see Chapter 20: Coastal Processes).

Operation

- 7.7.13 As the pipeline will be below ground, operational impacts are restricted to the areas around the AGI locations and the Pump Facility (including access roads) and will include increased lighting, noise, and very small amounts of carbon dioxide emissions from venting.
- 7.7.14 Operational impacts are therefore limited to the following IEFs:
- Operational lighting and noise from the Pump Facility could impact passage / wintering birds that are a designated feature of the Greater Wash SPA. Operational lighting at Salt End AGI and Thorngumbald AGI could also impact breeding / passage / wintering birds within the Humber Estuary and functionally linked land.
 - Nocturnal species may be impacted by operational lighting at AGI locations.
- 7.7.15 Such events could cause direct disturbance, changes in behaviour, reduced fitness and abandonment of features upon which they are reliant.
- 7.7.16 With regard to the intertidal and marine environment, operational impacts are largely not foreseen based on minimal impact pathways (aside from potential disturbance to bird features associated with AGI / Pump Facility presence).

Decommissioning

- 7.7.17 As the pipeline will be retained below ground once decommissioned, decommissioning impacts are restricted to the dismantling of AGIs and the Pump Facility and include temporary land use (for compounds) and direct and indirect impacts associated with pollution such as:
- Sediment run-off / silt dispersal / fuel or chemical spill, including potential for dispersal downstream (in the event of discharge to a watercourse).
 - Other pollution impacts (such as dust, noise and visual).
 - Increased deposition of nitrogen and other airborne pollutants during the decommissioning phase due to a deterioration in air quality from plant / vehicle emissions and increased traffic volumes on the affected road network.
- 7.7.18 Such events could cause direct disturbance leading to reduction, loss (of habitat and function) and / or fragmentation of habitat IEFs within the draft Order Limits. Indirect impacts could also be felt on IEFs situated outside of the draft Order Limits where they are hydrologically connected to AGI locations and / or are connected to the affected road network. For example, construction

pollution impacting Hedon Haven Clough (adjacent to Salt End AGI) could impact the Humber Estuary, if not contained.

- 7.7.19 With regards to flora and fauna, such events could cause disturbance, harm and mortality which for fauna could result in changes in behaviour, reduced fitness and abandonment of features upon which they are reliant.
- 7.7.20 Impacts to the intertidal and marine environment are not foreseen during decommissioning, based on the assumption that the pipeline will be left in-situ at the end of the Project's operational design life.

7.8 Additional Mitigation and Enhancement Measures

- 7.8.1 This section sets out potential additional mitigation and compensation measures which may be required should the ES find any potential residual significant effects following assessment in addition to those outlined in Section 7.6.
- 7.8.2 It follows the embedded mitigation measures set out in Section 7.6 and accordingly is limited to the information known at this stage of the design. Full details will be provided within the ES.

Construction

- 7.8.3 Specific construction mitigation measures (i.e. secondary mitigation which goes beyond the embedded mitigation in Section 7.6) will be identified within the ES following survey / assessment (as described within Volume 4 - Appendix 7.1, 7.2 and 7.3) and further design amendments. It will include specific / strategic habitat provision (in line with BNG requirements for NSIPs) and any measures necessary to satisfy HRA, Natural England derogation licences, Environment Agency permits and SSSI assent (where required).
- 7.8.4 Several embedded measures (e.g. HDD design, pollution control and sediment management) are dependent on underlying ground and hydrological conditions. Additional mitigation for habitats associated with watercourses, wetlands and hydrologically sensitive areas will be informed by the findings of Chapter 10: Ground Conditions and Hydrogeology and developed within the ES.

Habitat IEFs

- 7.8.5 The Applicant is seeking to adopt a sustainable approach to development by proactively taking measures to ensure that the Project leaves the environment

in a better condition than it was before development, i.e. delivering Net Gain. Net Gain measures include enhancements to biodiversity and natural capital which are over and above the measures which would be implemented to reduce the effects arising from development (i.e. requirements for avoidance, mitigation and compensation). Net Gain includes BNG, and for this Project focuses on strategic habitat enhancement and creation, aiming to identify and implement opportunities to improve patch quality and habitat connectivity and align with national nature recovery objectives and projects.

- 7.8.6 Proposed biodiversity enhancement measures, including habitat creation and landscape-scale connectivity, will not only deliver biodiversity net gain but also contribute to wider climate change adaptation and resilience (see Chapter 8: Climate Resilience and Adaptation). Delivery of these measures may also be dependent on maintaining appropriate hydrological conditions; cross-reference will therefore be made to Chapter 18: Hydrology and Land Drainage, which addresses water quality, drainage and flow regime considerations
- 7.8.7 Mitigation and enhancement measures, including monitoring and maintenance requirements will be developed within the ES as part of a Biodiversity Management Strategy. In principle, mitigation measures will focus on seeking to reduce, as far as practical, biodiversity losses and minimising impacts to retained habitats.

Species IEFs (General)

- 7.8.8 With regards to derogation licences, the Natural England DLL scheme is proposed for amphibians and thus a conservation payment is the only action on the Project in relation to this IEF; however, derogation licences may be required for badger, bats, otter and water vole (see below).

Birds

- 7.8.9 Although the extent of impact is unknown at this stage, the requirement for bird mitigation (for breeding, passage and wintering) is anticipated as widespread effects to large areas of suitable habitat is unavoidable. Measures are likely to include:
- Sensitive timing of works and disturbance mitigation measures.
 - Installation of severance prevention along flight paths.
 - Provision of artificial nest sites.
 - Reinstatement of affected habitat to a condition equal or better than it was prior to construction.

- Enhancement of unaffected habitats in proximity of construction activities and strategic habitat creation to expand and better connect populations.

7.8.10 It is acknowledged at this stage that uncertainty remains regarding the extent and achievability of such measures, particularly in relation to HRA. However, mitigation will be refined through the HRA to ensure that construction does not give rise to an adverse effect on the integrity of any European site.

Badger

7.8.11 The Project will seek to avoid badger setts; however, where this is not possible, a derogation licence will be obtained to allow the closure of setts. Where there is a loss of setts, the proposal could include creating artificial setts as a compensation measure.

Bats

7.8.12 The Project will seek to avoid known / suitable roost sites; however, the loss of trees / structures with roosting features cannot be ruled out at this stage. Where known roost sites cannot be avoided, a derogation licence will be obtained to allow the destruction of roosts. Where there is a loss of roosts, the proposal will include providing replacement roost sites as a compensation measure.

7.8.13 It is also proposed that bat boxes are provided to replace PRFs (regardless of whether they are confirmed as roosts). Additional measures for bats could include:

- Pre-construction roost surveys.
- Sensitive timing of works and disturbance mitigation measures.
- Soft felling of all trees that support PRFs.
- Veteranisation of retained trees which includes creating gaps and cracks with a chainsaw.
- The retention and reinstatement of PRFs from felled trees (for example by reinstating a felled tree trunk within a retained section of hedgerow or fixing the feature, like a bat box, to a retained tree).
- Installation of severance prevention along bat flight lines.
- Enhancement of known and potential bat flight lines by reinstating habitats in equal or better condition than pre-construction, enhancement of unaffected habitats in proximity of construction activities and / or strategic habitat creation to expand and better connect habitats.

Otter

- 7.8.14 Construction activities will seek to avoid impacts to watercourses and time works to avoid disturbance to resting sites whilst occupied. Nevertheless, temporary impacts to habitats utilised by otter are anticipated during construction and, accordingly, pre-construction surveys will be undertaken along with the installation of severance prevention along linear watercourses. In the unlikely event that any otter resting places are unavoidable, the loss will be mitigated for under licence from Natural England.

Water Vole

- 7.8.15 Although the extent of impact is unknown at this stage, the requirement for a water vole licence is anticipated as the species is widespread and effects to multiple watercourses are unavoidable. Natural England will only issue a licence in relation to a development proposal where the activity is necessary and where appropriate avoidance and mitigation measures are in place to minimise harm to the species. Therefore, the Project may proceed under licence provided suitable mitigation is implemented.

Intertidal

- 7.8.16 Prior to the commencement of works, agreement on the requirements in the nearshore area at Easington will be reached with consultees for any post-installation surveys in the intertidal area, to assess whether sensitive sites have been returned to their pre-installation state. A Beach Monitoring and Management Plan may also be agreed with the Local Authority and relevant consultees, as required. This Plan would detail the reinstatement of the beach to pre-construction condition, as far as reasonably practicable.

Operation

- 7.8.17 Monitoring of habitat creation / reinstatement and protected, notable species and / or INNS will be carried out as appropriate to determine operational effects upon receptors, measure success of mitigation measures and identify further mitigation / remedial measures or enhancements to be deployed post-construction. All monitoring requirements will be detailed in the Biodiversity Management Strategy.
- 7.8.18 Over the course of the lifetime of the Project there may be monitoring of the pipeline at the Easington Landfall to ensure it does not become exposed as a result of coastal erosion. However, it is important to note, the design of the

pipeline was developed to ensure sufficient burial depth and it is therefore assumed that the pipeline would not become exposed.

Decommissioning

- 7.8.19 The same mitigation measures are assumed for the decommissioning phase as implemented for the construction phase.

7.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 7.9.1 Table 7-14 below summarises the preliminary assessment of potential significant effects associated with the Project with the inclusion of embedded mitigation outlined in Table 7-9.

Table 7-14 – Summary of the Preliminary Assessment of Potential Significant Effects

IEF (and importance)	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Humber Estuary Corridor and Holderness Coast (International)	Construction	Potential temporary habitat loss / fragmentation (direct at the Holderness Coast only, and to land functionally linked to IEF), pollution (air, noise, vibration, light, water / sediment quality), species disturbance / harm / mortality (including lighting and noise, with indirect effects via prey availability) and changes in air quality.	Short - Medium-term	Standard embedded measures (avoidance, CEMP, surveys, method statements, reinstatement, ECoW) plus HRA-led controls, trenchless installation and route optimisation, coastal monitoring / reinstatement, noise management (e.g. vibratory piling, modelling), and minimisation of construction footprint and sensitive siting of permanent infrastructure (e.g. AGIs) to avoid designated or high-value habitats. HRA / ES to document additional measures to reduce significance of pollution (e.g. construction hoarding and habitat provision during construction period).	Uncertain but likely Not Significant following mitigation.
	Operation	Humber Estuary Corridor: None (scoped out). Holderness Coast: Risk of lighting and noise disturbance to species.	Long-term	Controls to be set out in the Biodiversity Management Strategy and HRA, with lighting minimised in duration, intensity and spill; details to be confirmed in the ES Noise / Lighting assessments.	Uncertain but likely Not Significant.
	Decommission	Pollution risk: indirect impact to habitat and species from construction pollution and changes in air quality.	Medium-term	Embedded measures within the DEMP (method statements, pollution controls).	Not Significant following mitigation
River Derwent Corridor (International)	Construction	Pollution risk to functionally linked land from construction pollution.	Medium-term	Embedded CEMP measures (method statements, pollution controls).	Not Significant following mitigation.
	Decommission	Pollution risk to functionally linked land from construction pollution.	Medium-term	Embedded DEMP measures (method statements, pollution controls).	Not Significant following mitigation.
Eskamhorn Meadows and Eastoft Meadow (National)	Construction	Pollution risk: air quality changes from the ARN.	Medium-term	Embedded CEMP measures (method statements, pollution controls). To be further assessed once ARN is fully understood and impacts assessed.	Uncertain.
The Lagoons SSSI (National)	Construction	Pollution risk: indirect impacts from construction pollution.	Medium-term	Embedded CEMP measures (method statements, pollution controls).	Uncertain but likely Not Significant following mitigation.
	Decommission	Pollution risk: indirect impacts from construction pollution.	Medium-term	Embedded DEMP measures (method statements, pollution controls).	Uncertain but likely Not Significant following mitigation.

IEF (and importance)	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Other non-statutory designated sites situated within the draft Order Limits (County)	Construction	Risk of habitat loss, fragmentation, and pollution impacts (air, noise, dust, vibration, light) to non-statutory sites ⁸ .	Medium-term	Embedded CEMP / Biodiversity Management Strategy measures (surveys, method statements, reinstatement, ECoW), minimisation of construction footprint and sensitive siting of permanent infrastructure (e.g. AGIs) to avoid designated or high-value habitats, plus site-specific measures developed with stakeholders where land take may occur.	Uncertain but likely Not Significant following mitigation.
Other non-statutory designated sites situated outside the draft Order Limits but with a potential impact pathway (County)	Construction	Risk of pollution and air quality changes from ARN.	Medium-term	Embedded CEMP measures (method statements, pollution controls); assessment to be updated once ARN effects are confirmed.	Uncertain but likely Not Significant following mitigation.
	Decommission	Risk of pollution and air quality changes from ARN.	Medium-term	Embedded DEMP measures (method statements, pollution controls).	Not Significant following mitigation.
Other notable sites: Keadby Ash Tip and Newton Garth (Up to National)	Construction	Risk of habitat loss, fragmentation, and pollution impacts (air, dust, noise, vibration, light).	Medium-term	Embedded CEMP / Biodiversity Management Strategy measures (surveys, method statements, reinstatement, ECoW), minimisation of construction footprint and sensitive siting of permanent infrastructure (e.g. AGIs) to avoid designated or high-value habitats, with additional site-specific mitigation to be developed in the ES.	Uncertain but likely Not Significant following mitigation.
	Decommission	Risk of pollution and air quality changes from ARN.	Medium-term	Embedded DEMP measures (method statements, pollution controls); assessment to be updated once ARN effects are confirmed.	Uncertain but likely Not Significant following mitigation.
Terrestrial and Freshwater Habitats (including recognised areas of priority habitat) situated outside of the above IEFs (Negligible to County)	Construction	Risk of habitat loss and construction pollution.	Medium-term	Embedded CEMP / Biodiversity Management Strategy measures (surveys, method statements, reinstatement, ECoW), minimisation of construction footprint and sensitive siting of permanent infrastructure (e.g. AGIs) to avoid designated or high-value habitats, with additional measures developed for sensitive habitats via HRA.	Uncertain but likely Not Significant following mitigation.
	Decommission	Risk of habitat loss and construction pollution during decommissioning.	Medium-term	Embedded DEMP measures (method statements, surveys, reinstatement and habitat enhancement).	Uncertain but likely Not Significant following mitigation.

⁸ Keadby Warping Drain LWS, New River Ancholme LWS, Ancholme Fields LWS, Hedon - Winestead Disused Railway Line LWS, Burkinshaw's Covert LWS, Chase Hill Wood LWS, Hodgson's Fields LWS, Whiting Mill Bottom Road Verges LWS, East Drain, South Ferriby LWS, Thornton Curtis Chalk Pit Road Verge LWS, Barton Road, Wootton Hall LWS, Keadby Boundary Drain LWS, Paupers' Drain LWS, Stainforth and Keadby Canal Corridor LWS and Hatfield Waste Drain LWS

IEF (and importance)	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Benthic ecology	Construction	Potential habitat loss, fragmentation, and indirect impacts (e.g. smothering, contamination) in intertidal zones at the Humber, Trent and Easington Landfall.	Short-term	Embedded measures including trenchless installation, route optimisation, limited use of coastal infrastructure, coastal monitoring / reinstatement, and adherence to best practice / CEMP (with post-installation surveys if required).	Uncertain but likely Not Significant following mitigation.
	Operation	Accidental release of carbon dioxide.	Short-term	Embedded design safety mechanisms and leak detection.	Uncertain but likely Not Significant following mitigation.
	Decommission	Temporary disturbance and sediment resuspension from localised works to make infrastructure safe at landfall / HDD pit locations.	Short-term	Embedded DEMP measures (method statements, surveys, reinstatement and habitat enhancement).	Not Significant following mitigation.
Protected and Noteworthy Species (flora, invertebrates, fish, reptiles, birds, bats, badger, otter, water vole and marine mammals) (Negligible to Regional)	Construction	Risk of species disturbance, harm or mortality from construction (including underwater noise, vibration, lighting, water quality changes), plus indirect impacts from habitat loss, fragmentation and pollution (air, dust, noise, vibration, light).	Short - Medium-term	Embedded CEMP / Biodiversity Management Strategy measures (surveys, method statements, reinstatement, ECoW), minimisation of construction footprint and sensitive siting of permanent infrastructure (e.g. AGIs) to avoid designated or high-value habitats, with additional HRA-led measures for birds and marine mammals.	Uncertain but likely Not Significant following mitigation.
	Operation	Risk of disturbance to nocturnal species from operational lighting, and potential ecological effects from accidental release of carbon dioxide from the operational pipeline.	Long-term	Lighting controls within Biodiversity Management Strategy / HRA (minimised duration, intensity and spill). Embedded pipeline safety systems and emergency response protocols. Details to follow in ES assessments.	Not Significant, subject to adequate lighting strategy and integrity measures.
	Decommission	Risk of disturbance, mortality and indirect impacts (habitat loss, fragmentation, pollution) during decommissioning.	Medium-term	Embedded DEMP measures (surveys, method statements, reinstatement and habitat enhancement).	Uncertain but likely Not Significant following mitigation.
Arboricultural features (TPOs and veteran trees) (Local to Regional)	Construction	Risk of indirect impacts (air quality, dust) from ARN.	Medium-term	Embedded CEMP measures (method statements, pollution controls).	Not Significant following mitigation.
INNS	Construction	Risk of INNS spread during site clearance.	Medium-term	Embedded CEMP measures, including an Invasive Species Management Plan where required.	Not Significant following mitigation.

7.10 Next Steps

Design Development

- 7.10.1 The design of the Project will continue to evolve, with ongoing refinements informed by the outcomes of ecological surveys, updated assessments, and application of the mitigation hierarchy. Ecological constraints and opportunities will be considered during micro-siting of infrastructure, trenchless crossing decisions, and reinstatement planning to minimise impacts on IEFs and maximise opportunities for biodiversity enhancement. This iterative approach will ensure that mitigation and enhancement measures are integrated into the design prior to submission of the ES and DCO application.

Engagement

- 7.10.2 The Ecology and Biodiversity assessment will be further developed and refined based on any relevant responses to Statutory Consultation and / or ongoing engagement.

Surveys

- 7.10.3 Further survey and assessment are required in advance of submitting the DCO application (as detailed in Survey Methodology (Volume 4 - Appendix 7.2)) in order to obtain a full and complete baseline with which to inform the EIA. Any gaps in the baseline will be considered and addressed along with specific mitigation measures as part of the assessments included within the ES.
- 7.10.4 In addition, it is recognised that ecological conditions may change before the start of construction, and up-to-date information survey information will be required to inform licensing requirements and species-specific mitigations during construction.
- 7.10.5 No specific monitoring requirements have been identified at this stage; however, this will be determined following detailed design and documented within the Biodiversity Management Strategy. This would include the means of recording monitoring data.
- 7.10.6 Should Natural England derogation licence(s) be required, then post-development monitoring may be a condition of the licence (i.e. to inform the success of mitigation / compensation and identify management and remedial operations). The survey effort would be agreed with Natural England as part of the licence application.

- 7.10.7 It is proposed that a comprehensive underwater noise assessment is undertaken for the Humber and tidal River Trent crossings, to assess the impact to noise sensitive species. Such an assessment is proposed to be incorporated at ES.

Further Assessment

- 7.10.8 Continued assessment of the potential impacts on IEFs during the construction, operational and decommissioning phases of the Project will be undertaken in accordance with the methodologies outlined in Section 7.4. The outputs of this process will inform the iterative Project design, ensuring avoidance and mitigation measures are embedded at detailed design stage. These measures will then be secured and enforced through the DCO requirements / consent conditions and implemented via contractor method statements, in line with the mitigation hierarchy. A detailed impact assessment of potential impacts on Ecology and Biodiversity during the construction, operation and decommissioning phases of the Project will be undertaken and included within the ES.
- 7.10.9 Assessment of impacts to designated sites for nature conservation from exhaust emissions from vehicles will be undertaken with traffic modelling data used to provide predictions of traffic flows for the affected road network. This data will be used to calculate emissions of pollutants such as nitrogen oxides and where the air quality modelling identifies potential exceedances to designated sites, these will then be subject to further assessment of their potential ecological effects within the Ecology and Biodiversity chapter of the ES and the HRA.
- 7.10.10 Results of the surveys and ecological assessment will be used to inform the development of the Biodiversity Management Strategy, specifically the mitigation and enhancement measures to be delivered.
- 7.10.11 An HRA will be prepared and accompany the ES as part of the DCO application, detailing any potential Likely Significant Effects upon European designated sites as a result of the Project. Where necessary, the assessment will include requirements for mitigation to ensure the favourable conservation status of qualifying features of European designated sites is maintained.
- 7.10.12 A BNG assessment (aligned with emerging legislation) will accompany the ES and detail changes in biodiversity units pre- and post-construction of the Project.

- 7.10.13 The surveys undertaken in the vicinity of the Easington Landfall in both June 2022 and April 2025 will inform the ES. Preliminary findings from the April 2025 survey have been presented throughout this PEIR document and in Intertidal Environment and Marine Ecology (Volume 4 - Appendix 7.3) and full results from the April 2025 survey will be presented in the ES.

7.11 References

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- Ref 7.2: HM Government (2021). Wildlife and Countryside Act 1981 (as amended). [online] Available at: <https://www.legislation.gov.uk/ukpga/1981/69> (Accessed: 04 August 2025).
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- Ref 7.5: HM Government (2000). Countryside and Rights of Way Act 2000. [online] Available at: <https://www.legislation.gov.uk/ukpga/2000/37/contents> (Accessed: 04 August 2025).
- Ref 7.6: HM Government (2006). Natural Environment and Rural Communities Act 2006. [online] Available at: <https://www.legislation.gov.uk/ukpga/2006/16/contents> (Accessed: 12 February 2022).
- Ref 7.7: HM Government (2006). The Animal Welfare Act. [online] Available at: <https://www.legislation.gov.uk/ukpga/2006/45/contents> (Accessed 04 August 2025).
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- Ref 7.12: HM Government (2021). Environment Act 2021. [online] Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted> (Accessed: 04 August 2025).
- Ref 7.13: HM Government (2024). The Management of Hedgerows (England) Regulations 2024. [online] Available at: <https://www.legislation.gov.uk/uksi/2024/680/contents/made> (Accessed 04 August 2025).
- Ref 7.14: Overarching National Policy Statement for Energy (EN-1) section 9(8) of the Planning Act (2008). [online] Available at: <https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf> (Accessed: 23 July 2025).
- Ref 7.15: National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) section 9(8) of the Planning Act (2008). [online] Available at: <https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf> (Accessed: 23 July 2025).
- Ref 7.16: Ministry of Housing, Communities and Local Government (2021) National Planning Policy Framework. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf (Accessed: 04 August 2025).
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- Ref 7.26: British Standards Institution (2010). BS 3998 – Trees work - Recommendations.

8 Climate Resilience

8.1 Introduction

- 8.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken for the assessment of Climate Resilience, including an In-Combination Climate Impact (ICCI) assessment. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 8.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary climate effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 8.1.3 This chapter should be read in conjunction with:
- Chapter 6: Air Quality, for dust suppression requirements as a result of potential climate-related periods of dry weather.
 - Chapter 7: Ecology and Biodiversity, for the assessment of climate change on ecological receptors.
 - Chapter 9: Greenhouse Gases, for the assessment of greenhouse gases as a result of the Project that could influence climate change.
 - Chapter 10: Ground Conditions and Hydrogeology, for the assessment of climate change on hydrogeological receptors.
 - Chapter 16: Traffic and Transport, for the construction traffic routes.
 - Chapter 18: Hydrology and Land Drainage, for potential flood risks as a result of climate change.
 - Chapter 20: Coastal Processes, for cliff erosion rates as a result of changes to the climate.
- 8.1.4 These chapters will be used to inform the ICCI and reported in the ES.
- 8.1.5 There are no additional figures to support this chapter.
- 8.1.6 This chapter is not supported by any appendices.

8.2 Legislation, Policy and Guidance

Legislation

8.2.1 Legislation relevant to Climate Resilience is detailed in Table 8-1.

Table 8-1 – Summary of Legislation relevant to Climate Resilience

Legislation	How it is considered within this PEIR
Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref 8.1)	The 2008 Climate Change Act requires governments to undertake a climate change risk assessment (CCRA) and develop a National Adaptation Programme over five-year periods. The third CCRA was published in 2021 and showed that the low emission scenario in the UK will ultimately result in significant climate-related impacts unless urgent action is taken. The CCRA3 identifies 61 climate risks which could affect the UK in the coming decades and has identified risks to human health and infrastructure, including high temperatures, flooding, sea level rise, and air quality.
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 8.2)	The Infrastructure Planning (Environmental Impact Assessment) Regulations set out requirements for assessing the environmental impacts of nationally significant infrastructure projects. The Regulations require that developers prepare an Environmental Statement (ES) assessing the likely significant effects of the Project on the environment, including the consideration of greenhouse gases and climate resilience.
The Paris Agreement (2015) (Ref 8.3)	The Paris Agreement, adopted in 2015, is a global framework aimed at combating climate change through both mitigation and adaptation strategies. It seeks to limit global warming to well below 2°C above pre-industrial levels, while pursuing efforts to keep it below 1.5°C. The Agreement requires countries to set nationally determined contributions (NDCs) to implement sustainable practices and innovations. For adaptation, it emphasises enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change. Countries are encouraged to develop national adaptation plans, share knowledge and best practices, and provide financial support to vulnerable nations to help them cope with climate impacts. The Agreement underpins the UK Climate Change Act and many other climate-related policies, legislation and guidance, and as such will be used to inform the ES chapter. Mitigation measures will be recommended based on their ability to enhance the Project's adaptive capacity, and to strengthen its resilience and reduce its vulnerability to climate change.

Policy

National Planning Policy

8.2.2 National Planning Policy relevant to Climate Resilience is detailed in Table 8-2.

Table 8-2 – Summary of National Planning Policy relevant to Climate Resilience

Planning Policy Reference	Policy Context	How it is considered within this PEIR
EN-1 (Ref 8.4)		
4.10.8	“New energy infrastructure will typically 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.”	This chapter considers the direct and indirect impacts of climate change on the Project, including risks associated with heavy precipitation and flooding, storms, heatwaves, and wildfire.
4.10.9	“The ES should set out how the proposal will take account of the projected impacts of climate change, using government guidance and industry standard benchmarks such as the Climate Change Allowances for Flood Risk Assessments, Climate Impacts Tool, and British Standards for climate change adaptation, in accordance with the EIA Regulations.”	This chapter utilises the Met Office’s UK Climate Projections 2018 (UKCP18) across multiple emissions scenarios, including a high emissions scenario (RCP 8.5). This assessment is informed by industry standards such as the IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (Ref 8.5), and mitigation measures have been recommended as appropriate.
4.10.10	“Applicants should assess the impacts on and from their proposed energy project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time.”	This chapter utilises the Met Office’s UK Climate Projections 2018 (UKCP18) (Ref 8.6) across multiple emissions scenarios, including a high emissions scenario (RCP 8.5).
4.10.11	“Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections.”	This chapter utilises the Met Office’s UKCP18 projections across multiple emissions scenarios, including a high emissions scenario (RCP 8.5).
EN-4 (Ref 8.7)		
2.3.4	“As climate change is likely to increase risks to some of this infrastructure, from flooding or rising sea levels for example, applicants should in particular set out how the proposal would be resilient to: Increased risk of flooding. • <i>Effects of rising sea levels and increased risk of storm surge.</i> • <i>Higher temperatures.</i> • <i>Increased risk of earth movement, coastal erosion, or subsidence from increased risk of flooding and drought.</i> Any other increased risks identified in the applicant’s assessment.”	This chapter sets out the likely potential impacts that these risks may have on the Project and measures that have been introduced to ensure the Project’s resilience to these impacts.
2.3.5	“The resilience of the project to climate change should be assessed in the Environmental Statement (ES) accompanying an application. For example, future increased risk of flooding should be covered in the flood risk assessment.”	This chapter sets out the likely potential impacts that these risks may have on the Project and measures that have been introduced to ensure the Project’s resilience to these impacts.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
NPPF (Ref 8.8)		
National Planning Policy Framework	The National Planning Policy Framework (NPPF) outlines requirements for addressing climate change through both mitigation and adaptation.	The NPPF mandates the use of strategic flood risk assessments to inform planning decisions and requires developments in flood zones to incorporate sustainable drainage systems unless proven unfeasible. Coastal areas should be managed through Coastal Change Management Areas, with provisions for relocation where necessary. Furthermore, the NPPF supports the use of natural flood management techniques, such as green infrastructure, to reduce the causes and impacts of flooding. This chapter assesses pluvial and coastal flood risk with the aim of informing planning decisions.

Local Planning Policy

8.2.3 Local Planning Policies relevant to Climate Resilience is detailed in Table 8-3.

Table 8-3 – Summary of Local Planning Policy relevant to Climate Resilience

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Yorkshire & Humber Climate Action Plan (2021) (Ref 8.9)	N/A	The Yorkshire & Humber Climate Action Plan consists of a regional target to achieve Net Zero by 2038. The Humber Carbon Capture Pipeline will aid in achieving these targets. The Plan also sets out how the region will build climate resilience, including: • Developing better climate risk communications. • Encouraging the wider adoption of climate adaptation plans. • Promote resilience in health, wellbeing, and community benefits. • Promote resilience in land use, food and farming. • Promote nature-based solutions and blue-green resilience infrastructure. • Promote climate resilience in business and industry; and Align all infrastructure sectors to deliver a regional systems approach.	This assessment has been undertaken as a means to ensure that the Project aligns with the Plan. Climate resilience measures included in the Plan have been considered in this chapter and recommendations provided as relevant.
The Humber Vision 2030 (Ref 8.10)	N/A	The Humber Vision 2030 is a joint strategy set out by partners from the public, private, and educational sectors to decarbonise the Humber Industrial Cluster. The policy seeks to set out a pathway for investing in net zero technologies and raise Humber's profile as a global net zero leader.	This assessment has been undertaken to ensure that the Humber Carbon Capture Pipeline, as one of the Vision's key infrastructure investments, will remain operational and resilient throughout its lifespan.
East Riding of Yorkshire Climate Change Strategy 2022-2030 (Ref 8.11)	N/A	The Climate Change Strategy 2022-2030 sets out how the East Riding of Yorkshire will achieve short term decarbonisation and climate resilience targets. It includes details of the current climate-related risks facing the area, including flooding, coastal change, and heatwaves, and how the East Riding needs to adapt in order to reduce the potential impacts.	This assessment has considered the risks and opportunities identified within the Strategy to ensure that the Project is aligned with the policies and targets set out by the Council and other relevant local authorities.
North Yorkshire Council Climate Change Strategy 2023-2030 (Ref 8.12)	N/A	The Climate Change Strategy 2023-2030 sets out how North Yorkshire Council will respond to the climate emergency in the short-term. The Strategy sets out how the Council will reduce GHGs, improve resilience, and support biodiversity. It sets out the most urgent risks facing North Yorkshire, including habitat loss, soil degradation, disruption of power supplies, and impacts to human health and wellbeing, as a result of climate change.	This assessment has considered the risks and opportunities identified within the Strategy to ensure that the Project is aligned with the policies and targets set out by the Council and other relevant local authorities.
A Green Future: Our Strategy (North Lincolnshire) (Ref 8.13)	N/A	The North Lincolnshire Council's Strategy is based on four key themes: • Net Zero and Sustainable Energy. • Resources, Waste and Water Management. • Our Natural Environment: People and Place. • A Shared Responsibility and A Shared Vision. The aims included within each of these themes include targets to invest in carbon capture and sequestration, improving biodiversity and manage habitats, and introduce mitigation measures to reduce flood risk.	This assessment has considered the risks and opportunities identified within the Strategy to ensure that the Project is aligned with the policies and targets set out by the Council and other relevant local authorities.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Local Plan 2013 to 2032, North East Lincolnshire (Ref 8.14)	N/A	Strategic Objective 2 (SO2) Climate Change addresses the causes and effects of climate change including responding to increasing flood risk. The objective recognises the increased stress on habitats and species that climate change causes. Policy 22 of the local plan highlights that good design in new developments includes the need to achieve climate change resilience. Policy 33: Flood risk highlights the risk of change in frequency, pattern and severity of flooding in the region. Flood risk management is critical to protecting people and property from flooding. It is particularly important in the Borough as much of the urban area is within the high flood risk zone, including large parts of Grimsby, Cleethorpes and Immingham. This policy requires an assessment of any development through its lifespan and that mitigation is considered and incorporated where possible.	This assessment has considered the risks and opportunities identified within the Strategy to ensure that the Project is aligned with the policies and targets set out by the Council and other relevant local authorities.
Selby District Council Local Plan 2022 (Ref 8.15)	N/A	The Selby Local Plan was published to set out how the District will grow up to 2040, including how investment will be utilised to improve infrastructure and community wellbeing in a sustainable, climate-conscious manner. This includes increasing the community's resilience to climate change impacts, particularly regarding flood resilience. The Plan specifies that new developments will be designed for climate change resilience, with emphasis placed on multi-functional mitigation approaches such as Sustainable Drainage Systems (SuDS).	This assessment has considered the aims and ambitions of the Plan to ensure that the Project is aligned with the policies and targets set out by the Council. This chapter includes multi-function mitigation recommendations, including those aimed to improve resilience to flooding.
East Riding of Yorkshire Local Plan 2020-2039 (Ref 8.16)	N/A	The East Riding of Yorkshire Local Plan sets out how the Council plans to address key planning issues and manage development up to 2039. The Plan includes policies for addressing climate change, including how the Council plans to improve resilience against climate change impacts such as flooding, extreme temperatures, and intense weather systems. Mitigation measures set out within the Plan include the routine undertaking of climate risk assessments in development processes, improving design resilience to flood risk, and considering water availability and infrastructure in development plans.	This assessment has considered the aims and ambitions of the Plan to ensure that the Project is aligned with the policies and targets set out by the Council. This chapter includes multi-function mitigation recommendations, including those aimed to improve resilience to flooding.
North Lincolnshire Local Development Framework Core Strategy (Ref 8.17)	N/A	The Core Strategy was adopted in 2011 and sets out the long-term strategy for North Lincolnshire up to 2026. Flood risk and climate change is identified as a significant challenge to North Lincolnshire within the Strategy, and flood risk management is one of the key aims included within its plans.	This assessment has considered the risks and opportunities identified within the Strategy to ensure that the Project is aligned with the policies and targets set out by the Council.

Guidance

- 8.2.4 The Climate Resilience assessment has been carried out in accordance with the following guidance:
- Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (IEMA, 2020) (Ref 8.5).
- 8.2.5 The IEMA Guidance on Climate Change Resilience and Adaptation emphasises integrating climate change considerations into project designs, requiring clear documentation of how these factors and extreme weather conditions are addressed. It mandates a detailed future climate characterisation, urging developers to adopt a single, coherent climate scenario. Insignificant risks can be acknowledged if supported by robust evidence. The guidance also stresses ensuring the Project's resilience to climate impacts, with key issues for infrastructure developments including increased flooding risk from extreme precipitation, greater thermal impacts due to high temperatures, and reduced operational capacity due to environmental stressors. This assessment will be undertaken in line with the methodology set out in the Guide, and mitigation measures will be recommended to ensure that the Project is resilient to any identified climate risks.

8.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 8.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined below.

Table 8-4 – Summary of Scoping Opinion relevant to Climate Resilience

Section Reference	Matter	Comments	Response
ID 3.4.5	In-combination climate impacts	The Scoping Report states that other environmental topics have taken current weather conditions into account, minimising the potential in-combination impacts during the construction period, which is anticipated to be 5 years. The Inspectorate agrees that this matter can be scoped out of this chapter on this basis.	Acknowledged – no action required.
Environment Agency Response	Design life	This section notes that the design life of the pipeline is 25 years although the Endurance Store has a capacity to store carbon far beyond this period. From a planning perspective the design life for non-residential development should be considered as 75 years. Recommendation: The lifetime for non-residential development from a climate change perspective should be considered as 75 years as a starting point. On this basis, the 2080's epoch should be used as the time horizon for establishing fluvial climate change uplifts. For tidal climate change uplifts, the appropriate sea level rise allowances (Higher Central and Upper) should be applied to the end of the 75-year lifetime. Further details on the climate change allowances to apply can be found online at: Flood risk assessments: climate change allowances - GOV.UK.	The PEIR has considered a 75-year design life and used appropriate time slices and uplifts as recommended.
Environment Agency Response	Climate risk and mitigation	The Air Quality chapter explores dust suppression and includes reference to an adequate water supply required for wheel wash. Additionally, the climate change chapter identifies drought as a	Acknowledged – this has been considered within the PEIR.

Section Reference	Matter	Comments	Response
		potential hazard which threatens water availability for dust suppression (and HDD). The potential sources of supply for these activities is not defined. It could be inferred that they would be those identified above. Recommendation: we agree that drought is considered a hazard relating to climate change and that it threatens water availability should we experience periods of prolonged dry weather (which will potentially increase the need for dust suppression).	
Environment Agency Response	Climate risk	We agree with the climate hazards identified within this table from a flood risk perspective. We welcome the scoping in of climate resilience to the climatic conditions identified during the construction, operation, and decommissioning phases.	Acknowledged – this has been considered within the PEIR.
Natural England Response, Annex A	Climate risk and interdependencies	The England Biodiversity Strategy published by Defra establishes principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles and identify how the development's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained. The NPPF requires that the planning system should contribute to the enhancement of the natural environment 'by establishing coherent ecological networks that are more resilient to current and future pressures' (NPPF Para 174), which should be demonstrated through the ES.	An In-Combination Climate Impact (ICCI) assessment has been carried out in the PEIR, with consideration given to ecology and biodiversity.

Section Reference	Matter	Comments	Response
ID 3.14.17	Extreme weather conditions	The Scoping Report seeks to scope out impacts from extreme weather conditions as a separate matter from the Major Accidents and Disasters ES Chapter. The assessments would instead be presented in the Climate Change, Adaptation and Resilience ES Chapter. The Inspectorate is content with this approach but advises the applicant to provide clear cross-referencing in the Major Accidents and Disasters ES aspect chapter to where the assessments are located.	Acknowledged – this has been included within the PEIR.

Summary of Engagement

- 8.3.2 No specific engagement regarding Climate Resilience has been undertaken with the relevant local authorities at the time of writing this PEIR.

8.4 Assessment Methodology

Baseline Data

Study Area

- 8.4.1 The Study Area for each phase of the Project is set out below:
- Construction Phase – the Project's construction footprint, i.e. the pipeline route and surrounding construction area.
 - Operational Phase – the Above Ground Infrastructure (AGI), access roads and Pump Facility only, with no buffer area. As the pipeline will be buried underground, it is not considered vulnerable to climate-related impacts during the operational phase. Risk of ground movement due to shrink / swell subsidence will be assessed and reported in the ES in collaboration with Chapter 10: Ground Conditions and Hydrogeology, at which point the pipeline may be scoped in if deemed necessary.
 - Decommissioning – the AGIs and Pump Facility.
- 8.4.2 The Study Area of the ICCI assessment has been defined by the Zone of Influence (Zol) of each environmental discipline included within the PEIR. As weather conditions have been considered within the construction impact assessment of other environmental disciplines, the construction phase has been scoped out of the ICCI assessment. See Section 8.1 for relevant chapters that have considered weather conditions. The operational and decommissioning phases are within scope as the effects identified during these periods could be exacerbated by climate-related impacts.
- 8.4.3 It should be noted that though the pipeline has been scoped out of the operational phase assessment for Climate Resilience, all assets have been included within the ICCI assessment. Climate change alone is unlikely to affect the pipeline but may compound other hazards, and as such has been assessed as potential in-combination impacts in line with the approaches set out by other environmental disciplines.

Baseline Data Collection

Desk Study Sources

- 8.4.4 Baseline conditions of the Project were established during a desk study using the following sources:
- Met Office HadUK-Grid over UK for monthly, seasonal or annual data (Ref 8.18).

Site Visits and Surveys

- 8.4.5 No site visits or surveys have been undertaken for Climate Resilience.

Impact Assessment Methodology

- 8.4.6 The Climate Resilience assessment has been undertaken in line with IEMA's Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (Ref 8.5).
- 8.4.7 The significance of an anticipated impact on the Project has been determined based on the methodology set out within this guidance, alongside professional judgement based on industry best practice. Likelihood and consequence scores assigned through qualitative assessment have been combined to assess overall significance; see Table 8-8 for more detail.

Sensitivity

- 8.4.8 Sensitivity is defined as “the degree of response of a receiver to a change and a function of its capacity to accommodate and recover from a change if it is affected” (Ref 8.5). Once a receptor was identified, its sensitivity was identified based on the criteria set out in Table 8-5.

Table 8-5 – Sensitivity Definitions

Sensitivity	Description
High sensitivity	The receptor is directly dependent on the existing climate conditions to continue to operate now and in the future or may only tolerate minimal change in climate conditions.
Medium sensitivity	The receptor is dependent on the current climate conditions to an extent but can continue to function under a range of conditions and will tolerate some change.

Sensitivity	Description
Low sensitivity	The current and future climate conditions have limited effect on the receptor.
Negligible	The current and future climate conditions have no effect on the receptor.

- 8.4.9 Once the sensitivity of a receptor was determined, the likely potential impacts of climate change on the Project and its receptors were identified. Based on the sensitivity of a given receptor, the likelihood and consequence of an effect was assessed qualitatively based on the criteria set out in Table 8-6 and Table 8-7.

Likelihood

- 8.4.10 The likelihood of an effect has been assessed based on trends identified within the Met Office's UK Climate Projections 2018 (UKCP18). Future climate conditions have been assessed under a high-emission climate scenario, Representative Concentration Pathway 8.5 (RCP 8.5). RCP 8.5 is considered to be a 'worst-case scenario', thereby representing the most severe potential climate changes. Projections have been used at the 50th percentile.
- 8.4.11 Likelihood, given as the probability of an effect occurring over the lifetime of the Project, has been determined based on the criteria outlined in Table 8-6 . It should be noted that, though the design life of the pipeline is anticipated to be 25 years, a 75 year lifespan has been assessed as best practice. The consideration of an effect's likelihood ensures that climate projections are accounted for within an assessment and are aligned with IEMA guidance (Ref 8.5).

Table 8-6 – Likelihood Definitions

Likelihood	Description
Very low	The event may occur once during the lifetime of the Project.
Low	The event occurs during the lifetime of the Project e.g., once in 75 years.
Medium	The event occurs limited times during the lifetime of the proposed Project e.g., approximately once every 10 years.
High	The event occurs several times during the lifetime of the proposed Project, e.g., approximately once every five years.

Likelihood	Description
Very high	The event occurs multiple times during the lifetime of the proposed Project, e.g., approximately annually.

- 8.4.12 For the ICCI assessment, receptors relevant to the location and scale of the Project have been identified and their likely significant effects evaluated in consideration of other environmental disciplines. The vulnerability / susceptibility of a receptor to changes in the future climatic baseline have been identified accordingly.

Consequence

- 8.4.13 The consequences associated with each anticipated impact have been assessed using the criteria defined in Table 8-7. The assessment of likelihood and consequence considers existing design controls and embedded mitigation, as identified through engagement with design teams.
- 8.4.14 It should be noted that 'consequence' has been used in this chapter in place of 'magnitude' to align with IEMA guidance.
- 8.4.15 The ICCI assessment has utilised the magnitude of effects identified by other environmental disciplines to consider whether climate change is likely to change the significance of the effects identified by other environmental disciplines.

Table 8-7 – Consequence Definitions

Measure of Consequence	Description
Negligible	Little to no consequence on the construction or operation of the Project.
Minor adverse	Localised disruption causing minor interruption to operations or services (e.g., less than one day) but no permanent or long-lasting effect on the Project. Minimal financial, reputational, environmental or health and safety losses.
Moderate adverse	Some localised damage to infrastructure causing temporary interruption to operations or services (less than a week) and requiring repair. Moderate financial, reputational, environmental or health and safety losses.
Large adverse	Damage to infrastructure is extensive causing major interruption to operations and services (more than a week)

Measure of Consequence	Description
	and requiring major repairs or replacement of infrastructure. Major financial, reputational, environmental or health and safety losses.
Very large adverse	Permanent damage leading to complete loss of operations on the site for an extended period of time and requiring replacement of infrastructure across the majority of the site. Extreme financial, reputational and environmental losses extending beyond the limits of the site. Severe health effects and / or fatalities.

Significance

- 8.4.16 The likelihood and consequence of effects identified within this assessment have been applied to the matrix presented in Table 8-8 to determine the overall significance of each effect on a given receptor.

Table 8-8 - Significance Matrix

Likelihood	Consequence				
	Negligible	Minor adverse	Moderate adverse	Large adverse	Very large adverse
Very low	Not significant	Not significant	Not significant	Not significant	Not significant
Low	Not significant	Not significant	Not significant	Significant	Significant
Medium	Not significant	Not significant	Significant	Significant	Significant
High	Not significant	Significant	Significant	Significant	Significant
Very high	Not significant	Significant	Significant	Significant	Significant

- 8.4.17 Significance within the ICCI assessment has been identified based on the significance criteria used by the relevant environmental disciplines. This has been used to determine whether future climatic conditions change the significance of the anticipated effect.

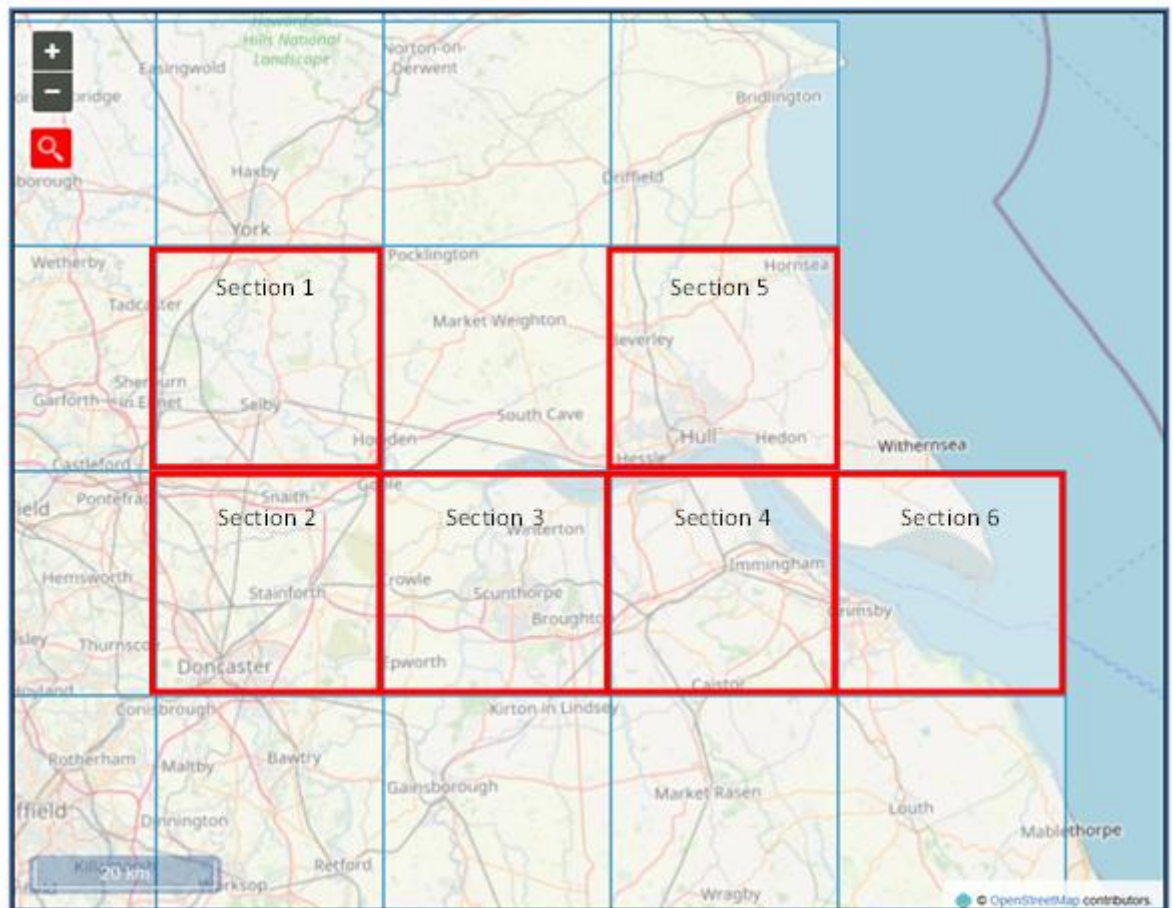
Assumptions and Limitations

- 8.4.18 The Climate Resilience assessment has utilised UKCP18 data to assess how climate-related risks will change throughout the anticipated lifespan of the Project. UKCP18 is a global leader in climate science, providing high-resolution spatially coherent climate projections for the UK and the globe. However, these projections are reliant on a series of assumptions based on climate observations, numerical modelling, and the latest policy developments, and as such are subject to inaccuracies.
- 8.4.19 This assessment presumes stability in the existing regulatory and policy frameworks, recognising that any future changes could affect timescales, costs, and feasibility.
- 8.4.20 The assessment is affected by assumptions associated with climate modelling and climate change projections, incorporated in UKCP18. Climate projections take into account uncertainty due to natural variability and an incomplete understanding of the climate system and its imperfect representation in models. The projections do this by giving the probabilities of a range of possible outcomes, as estimated by scientific methodology. While the global projections provide a range of climate futures, they cannot cover all potential future climate outcomes.
- 8.4.21 It should be noted that there is limited methodological guidance on the assessment of individual risks. There is often uncertainty in the relationship between changes in climate hazards and the respective response in terms of asset performance; as such, these have been assessed qualitatively.

8.5 Baseline Conditions

Existing Baseline

- 8.5.1 The Project is located in the Met Office profile of Eastern England, where much of the area is below 60 metres in altitude. Data from the HadUK-Grid (Ref 8.18) has been used at a 25km resolution to capture baseline climate information for the Project, as demonstrated in Insert 8-1. For the purpose of this assessment, the route has been divided into 6 sections determined by its location within the UKCP18 25km resolution grid.



Insert 8-1 – Study Area at a 25km Grid Resolution (UKCP18)

- 8.5.2 Table 8-9 presents the observed climate conditions in each section, averaged over the baseline period of 1981-2010, including mean annual temperature, summer maximum temperature, winter minimum temperature, and annual and seasonal precipitation. These metrics provide a comprehensive overview of the typical weather conditions within the draft Order Limits, essential for assessing local climate patterns and informing decisions related to planning and development.

Table 8-9 – Baseline Climate Conditions within the draft Order Limits for the period 1981-2010.

Variable	Description	1981-2010 baseline climate conditions						
		1	2	3	4	5	6	All sections
Mean annual temperature (°C)	Average of daily mean air temperature over the year	9.66	9.92	9.81	9.70	9.77	9.84	9.78
Summer maximum temperature (°C)	Average of daily maximum air temperature over the season	20.45	20.70	20.64	20.28	20.13	19.71	20.32
Winter minimum temperature (°C)	Average of daily minimum air temperature over the season	1.22	1.43	1.30	1.28	1.46	1.71	1.40
Annual precipitation (mm)	Total precipitation amount over the year	597.53	591.53	619.42	636.69	651.24	593.25	614.94
Summer precipitation (mm)	Total precipitation amount over the season	167.13	169.70	175.48	171.36	177.09	160.75	170.25
Winter precipitation (mm)	Total precipitation amount over the season	137.75	130.63	139.60	151.91	157.27	142.61	143.29

- 8.5.3 Between 1981-2010, daily mean air temperature averaged at 9.78°C across the 6 sections. The average daily temperature during summer months ranged from 19.71°C at the coast to 20.70°C further inland. Winter minimum temperatures, however, were higher towards the coast, ranging from 1.22°C in Section 1 to 1.71°C in Section 6.
- 8.5.4 Mean annual precipitation across the area averaged at 614.94 mm, receiving higher levels of precipitation in the summer months than in the winter, averaging at 170.25 mm and 143.29 mm, respectively.

Future Baseline

- 8.5.5 Climate projections relative to the 1981-2010 baseline have been used to inform future baseline conditions. The recommended lifespan for a non-residential development is 75 years; as such, climate projection data for the periods of 2010-2039, 2040-2069, and 2070-2099 have been selected.
- 8.5.6 UKCP18 (Ref 8.5) provides the most up to date climate change projections for the UK, offering a wide range of climate variables up to the end of the 21st century. This assessment focuses on the Representative Concentration Pathway (RCP) 8.5 scenario, a worst-case scenario where global GHG emissions continue to rise, with an average increase in global average temperature of 4.3°C by 2100. Projections are presented for each of the 25km grid squares encompassing the route (sections 1 to 6) for the periods of 2010-2039, 2040-2069, and 2070-2099, relative to a 1981-2010 baseline.

Table 8-10 – Climate Projections under RCP 8.5 relative to a 1981-2010 Baseline (UKCP18)

Variable	Projected anomaly from 1981-2010 baseline per section																	
	2010-2039						2040-2069						2070-2099					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Mean annual temperature (°C)	0.77	0.77	0.77	0.76	0.76	0.76	1.84	1.85	1.84	1.82	1.80	1.81	3.54	3.56	3.54	3.49	3.46	3.48
Summer maximum temperature (°C)	1.01	1.03	1.01	0.97	0.96	0.97	2.46	2.50	2.47	2.39	2.34	2.38	4.93	5.01	4.91	4.71	4.61	4.68
Winter minimum temperature (°C)	0.65	0.65	0.66	0.82	0.67	0.67	1.69	1.70	1.71	2.04	1.72	1.72	3.07	3.08	3.10	3.99	3.14	3.15
Annual precipitation (%)	1.36	1.17	1.11	1.50	1.62	1.55	-1.22	-1.49	-2.60	-2.36	-2.27	-2.30	-0.06	-0.52	-2.20	-1.58	-1.32	-1.42
Winter precipitation (%)	3.11	2.64	2.51	2.86	3.20	2.98	7.14	6.73	6.69	7.32	7.35	7.58	16.12	15.90	15.98	17.59	17.59	18.21
Summer precipitation (%)	-3.45	-3.19	-1.94	-1.66	-3.25	-1.65	-14.76	-14.73	-14.28	-14.31	-14.81	-14.38	-28.38	-29.07	-29.84	-29.36	-28.53	-29.40

- 8.5.7 The projections under RCP 8.5 indicate significant shifts in temperature and rainfall patterns up to the end of the century. A rise in summer maximum temperature is anticipated alongside increasing winter minimum temperatures. The impacts associated with these changes are likely to increase in likelihood and severity throughout the lifetime of the Project as temperatures continue to rise.
- 8.5.8 A significant change in precipitation is anticipated throughout the construction, operation, and decommissioning phases. Notable reduction in summer rainfall indicates a higher likelihood of drought conditions, with precipitation falling by up to 29.40% during the period of 2070-2099. In contrast, winter precipitation is expected to rise by up to 18.21% during the same period, resulting in increased risk of winter flood events. These flood events may be further exacerbated by dry summer conditions, resulting in increased surface runoff.

UKCP18 Marine Projections have been used at a 12km resolution to capture the risks to the Project from rising sea levels. The 12km grid squares shown in

- 8.5.9 have been selected to represent the coastal part of the route.



- 8.5.10 Table 8-11 below presents the 50th percentile projected time-mean sea level anomalies for the years 2020, 2050 and 2080, relative to a 1981-2000 baseline (as opposed to the 1981-2010 baseline previously used for land projections).

Table 8-11 - Marine Projections (50th Percentile) under RCP 8.5 relative to a 1981-2000 Baseline (UKCP18).

Section	Time-mean sea level anomaly (m) relative to 1981-2000		
	2020	2050	2080
A	0.11	0.29	0.55
B	0.11	0.29	0.56
C	0.11	0.30	0.56
D	0.11	0.30	0.57

- 8.5.11 Across the Study Area, the projections show an increase in sea level ranging from 0.29-0.30 m by 2050 and 0.55-0.57 m by 2080.

- 8.5.12 The ES will report the engagement with the flood risk team to assess in more detail the risks arising from flooding and sea level rise.

8.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 8.6.1 The design of the pipeline, including the optionality for crossing the River Humber, has factored climate change into the routeing. Following the acquisition of the Project from National Grid Ventures, the design was further amended and updated to account for climate factors (see Chapter 3: Consideration of Alternatives for more).
- 8.6.2 The area to the north of North Lincolnshire traversed by the draft Order Limits falls almost entirely within Flood Zone 3, which is likely to be more susceptible to climate change over the lifetime of the Project. The development and selection of the North of Scunthorpe route minimises the distance of the Project that falls within the Flood Zone, thereby reducing interference within the flood plain during construction, operation and decommissioning of the Project.
- 8.6.3 Where practicable, AGI locations have been selected to minimise impacts on the flood plain, balancing the Project's climate resilience with the safety of the local population. AGI sites will be built up to a safe level, removing any increase in flood risk while maintaining the ability to vent CO₂ at a low height in case of an emergency. The Project has and will continue to consider the effect of sea level rise over the lifetime of the Project, including the consideration of the location of flood defences, and will not interfere with the operation or maintenance of these flood defences.

Embedded Mitigation

- 8.6.4 As per the IEMA guidance (Ref 8.5), mitigation measures pertaining to climate resilience will be developed in line with the principles of the mitigation hierarchy:
- Avoid and / or prevent – Avoid potential environmental impacts through project design considerations and take action to prevent potential impacts by taking action to remove the risk or intervene to reduce impacts to receptors.
 - Minimise – All remaining risks should be mitigated through actions that consider project conditions and context in line with industry best practice, with the aim to minimise adverse effects.

- Enhance – Strengthen the Project’s capacity to be resilient to climate change, taking advantage of opportunities offered by the natural environment and / or providing opportunities for environmental enhancement.
- Compensate – Any remaining unmitigated or residual impacts should be offset through environmental enhancement.

8.6.5 The following mitigation measures in Table 8-12 are recommended measures which are expected to become embedded mitigation measures as the design progresses. These measures will be further refined throughout the design process.

Table 8-12 – Embedded Mitigation

Ref	Measure	Project Phase	Responsible Party
CL1	Pipe trenches should be exposed for the minimum length of time where possible to reduce risks associated with water accumulation. Where necessary, outfall drains should be reconnected across the trench as part of the backfill operation.	Construction	Contractor
CL2	Additional post-construction drainage should be installed where necessary to ensure that any existing drainage infrastructure impacted by the construction process remains operational.	Construction	Contractor
CL3	Landscaping designs should consider using drought-resistant vegetation to reduce die-back and improve soil stability, decreasing the risk of slope instability arising from variable precipitation rates.	Construction	Contractor
CL4	Material durability should be considered within the design to ensure that the pipeline and associated AGIs are able to withstand future climatic changes and their associated impacts.	Construction	Contractor
CL5	Construction activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk periods.	Construction	Contractor
CL6	Where defined by design, anti-corrosion coatings (e.g. Fusion Bonded Epoxy) should be used to prevent corrosion and other impacts associated with climate impacts.	Construction	Contractor
CL7	The pipeline and associated AGIs will be regularly maintained to ensure maximum operational efficiency and proactively monitor and repair faults. Pipelines will be internally inspected periodically in addition to regular maintenance activities to check for corrosion and any other potential damage arising from climate-related hazards.	Operation	Site User
CL8	Increasing rates of material deterioration should be considered in maintenance regimes.	Operation	Site User

Ref	Measure	Project Phase	Responsible Party
CL9	Implement automatic leak monitoring systems to ensure that any compromises to the pipeline that may arise as a result of climate-related impacts are repaired swiftly by specialist maintenance staff.	Operation	Site User
CL10	Emergency response plans should be developed and regularly tested to ensure that staff are equipped to address any pipeline damages that may arise from climate hazards swiftly and effectively.	Operation	Site User

- 8.6.6 Primary mitigation will be managed through the Construction Environmental Management Plan (CEMP), including the management of climate hazards and relevant mitigation measures.
- 8.6.7 Secondary mitigation will include any measures intended to reduce the risks associated with climate hazards throughout the construction and operation phases. These will be embedded within the design and will be developed throughout the design process.

8.7 Preliminary Assessment of Potential Impacts

- 8.7.1 The construction, operation, and decommissioning phases of the Project have been considered within the preliminary impact assessment for Climate Resilience. The likely potential impacts identified for each stage of the Project have been set out in the sections below. These impacts will be re-assessed as the design progresses and mitigation measures are further developed.

Construction

- 8.7.2 The potential impacts for Climate Resilience associated with the construction phase are provided in Table 8-13.

Table 8-13 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Climate Variable	Description of Potential Impact	Sensitivity of Receptor	Likelihood of Impact	Consequence of Impact	Significance
Construction equipment (e.g. vehicles, excavators)	High temperatures	Machinery may experience failure or reduce efficiency during heatwaves, resulting in delays to the construction programme	Low	Low	Minor Adverse	Not Significant
	Low temperatures	Machinery may experience difficulty operating during low / freezing temperatures, resulting in delays to the construction programme	Low	Low	Minor Adverse	Not Significant
	Heavy rainfall / flooding	Machinery, particularly engine-powered machinery, may be damaged by heavy precipitation or flooding or may be required to move if a flood event occurs, resulting in additional costs and delays to the programme.	Medium	Medium	Minor Adverse	Not Significant
	Drought	Prolonged dry periods leading to increased dust pollution may lead to increased dust deposition within machinery, resulting in damage and increased costs or delays to the construction programme.	Low	Low	Minor Adverse	Not Significant
Construction materials	High temperatures	The quality of construction materials may be reduced due to hot and dry weather, reducing moisture content of concrete and masonry and therefore resulting in low compressive strength. High temperatures may also warp steel and plastic-based products, further reducing the strength of structures. This may result in increased costs and delays to the construction programme, as well as potential safety impacts during the operational phase.	Medium	Low	Moderate Adverse	Not Significant
	Heavy rainfall / flooding	Time-sensitive materials (e.g. concrete) may be wasted if adverse weather conditions delay activities, resulting in additional costs.	Medium	Medium	Minor Adverse	Not Significant
Building site (e.g. temporary construction site facilities)	Heavy rainfall / flooding	Heavy precipitation could lead to localised flooding of construction sites, leading to flooding of temporary structures and comfort facilities.	Low	Medium	Minor Adverse	Not Significant
Road network (e.g. access roads)	High temperatures	High temperatures may lead to road melt, blocking access to construction sites and resulting in delays to the construction programme.	Medium	Very Low	Minor Adverse	Not Significant
	Heavy rainfall / flooding	Heavy precipitation may overwhelm drainage infrastructure and lead to localised flooding on the road network, blocking access to construction sites and resulting in delays to the construction programme.	Medium	Medium	Minor Adverse	Not Significant
Environment (e.g. water bodies, landscape)	Heavy rainfall / flooding	Increased risk of erosion of stockpiles and earthworks causing sediment runoff, resulting in a build up of silt and debris in the drainage network and subsequent pollution of nearby waterbodies.	Medium	Medium	Minor Adverse	Not Significant
Human health (e.g. site workers)	High temperatures	Increased risk of heat exhaustion and heat stress for site workers, potentially resulting in injury.	Medium	Low	Moderate Adverse	Not Significant
	Low temperatures	Increased risk of hypothermia for site workers, potentially resulting in injury.	Medium	Very Low	Moderate Adverse	Not Significant

Resource / Receptor	Climate Variable	Description of Potential Impact	Sensitivity of Receptor	Likelihood of Impact	Consequence of Impact	Significance
	Heavy rainfall / flooding	Heavy rainfall may lead to increased safety risks to site workers as a result of localised flooding, potentially resulting in injury.	Medium	Low	Moderate Adverse	Not Significant
	Drought	Insufficient water due to prolonged dry conditions may reduce availability and / or efficacy of dust suppression techniques, leading to respiratory impacts.	Low	Low	Moderate Adverse	Not Significant
		Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.	High	Low	Very Large Adverse	Significant

Operation

- 8.7.3 The potential impacts for Climate Resilience associated with the operational phase are provided in Table 8-14.

Table 8-14 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Climate Variable	Description of Potential Impact	Sensitivity of Receptor	Likelihood of Impact	Consequence of Impact	Significance
Infrastructure (pipeline and AGIs)	High temperatures	Potential overheating of AGIs resulting in structural damage and cracking/warping of fabric, requiring repairs.	Medium	Medium	Moderate Adverse	Significant
	Heavy rainfall / flooding	Extreme precipitation may overwhelm drainage infrastructure, resulting in surface flooding and damage to electrical equipment and pump facility. Saturation of soils may reduce ground stability, particularly when preceded by prolonged dry conditions, potentially resulting in landslides and damages to the pipeline, AGIs and pump facility.	Medium	High	Moderate Adverse	Significant
	Sea level rise	Sea level rise increases the risk of flooding during high tide and storm surges, resulting in potential damage to electrical equipment and pump facility. Saturation and increased salinity of soils may cause vegetation die back and reduced ground stability, potentially resulting in landslides and damages to the pipeline, AGIs and pump facility.	Medium	Low	Moderate Adverse	Not Significant
	Drought	Prolonged dry conditions may reduce ground stability, particularly when followed by significant rainfall events, potentially resulting in landslides and damages to the pipeline and AGIs.	Low	Low	Moderate Adverse	Not Significant
Infrastructure (e.g. access roads and pavements)	High temperatures	Extreme temperatures may lead to road melt, blocking access to the pipeline and AGIs and preventing access for routine or emergency maintenance.	Medium	Medium	Minor Adverse	Not Significant
	Heavy rainfall / flooding	Heavy precipitation may overwhelm drainage infrastructure and lead to surface flooding, blocking access to the pipeline and AGIs and preventing access for routine or emergency maintenance.	High	High	Minor Adverse	Significant
	Sea level rise	Sea level rise may lead to increased risk of flooding during high tide or storm surges, with the potential to block road access to the pipeline and AGIs and preventing access for routine or emergency maintenance.	Low	Low	Minor Adverse	Not Significant
Landscape (e.g. hedgerows and planting)	High temperatures	The landscape design may be compromised if vegetation is not resilient to increasing temperatures. This may in turn reduce soil stability, increasing the risk of ground movement and damages to the pipeline and AGIs.	Medium	Medium	Moderate Adverse	Significant
	Drought	The landscape design may be compromised if vegetation is not resilient to drought. This may in turn reduce soil stability, increasing the risk of ground movement and damages to the pipeline and AGIs.	Medium	Medium	Moderate Adverse	Significant
Human health (e.g. operational workers)	High temperatures	Increased thermal impacts on operational workers may lead to overheating, increasing the risk of heat stress or heat exhaustion and potentially resulting in injury.	High	Medium	Moderate Adverse	Significant

Resource / Receptor	Climate Variable	Description of Potential Impact	Sensitivity of Receptor	Likelihood of Impact	Consequence of Impact	Significance
	Low temperatures	Increased thermal discomfort and risk of hypothermia, requiring medical attention and potentially resulting in injury.	Low	Low	Moderate Adverse	Not Significant
	Heavy rainfall / flooding	Heavy rainfall may lead to increased safety risks to operational workers as a result of localised flooding, potentially resulting in injury.	Medium	Medium	Moderate Adverse	Significant
	Drought	Insufficient water due to prolonged dry conditions may reduce availability and / or efficacy of dust suppression techniques, leading to respiratory impacts.	Medium	Low	Moderate Adverse	Not Significant
		Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.	Medium	Low	Very Large Adverse	Significant

Decommissioning

- 8.7.4 The potential impacts for Climate Resilience associated with the decommissioning phase are provided in Table 8-15.

Table 8-15 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Climate Variable	Description of potential impact	Sensitivity of receptor	Likelihood of impact	Consequence of impact	Significance
Equipment (e.g. excavators, vehicles)	High temperatures	Machinery may experience failure or reduced efficiency during heatwaves, resulting in delays to the decommissioning programme.	Low	Medium	Minor Adverse	Not Significant
	Low temperatures	Machinery may experience difficulty operating during low/freezing temperatures, resulting in delays to the decommissioning programme	Low	Very Low	Minor Adverse	Not Significant
	Heavy rainfall / flooding	Machinery may be damaged by heavy precipitation or flooding, resulting in additional costs and delays to the programme.	Medium	Low	Minor Adverse	Not Significant
	Sea level rise	Sea level rise may result in flooding during high tide or storm surges, potentially resulting in damage to equipment leading to additional costs and delays to the programme.	Medium	Low	Moderate Adverse	Not Significant
	Drought	Prolonged dry periods leading to increased dust pollution may lead to increased dust deposition within machinery, resulting in damage and	Low	Medium	Minor Adverse	Not Significant

Resource / Receptor	Climate Variable	Description of potential impact	Sensitivity of receptor	Likelihood of impact	Consequence of impact	Significance
		increased costs or delays to the programme.				
Infrastructure (e.g. access roads)	High temperatures	High temperatures may lead to road melt, blocking access and resulting in delays to the programme.	Medium	Medium	Minor Adverse	Not Significant
	Heavy rainfall / flooding	Heavy precipitation may overwhelm drainage infrastructure and lead to localised flooding on the road network, blocking access and resulting in delays to the programme.	Medium	Low	Minor Adverse	Not Significant
	Sea level rise	Sea level rise may lead to increased risk of flooding during high tide or storm surges, with the potential to block road access to the pipeline and AGIs and resulting in delays to the programme.	Low	Low	Minor Adverse	Not Significant
Human Health	High temperatures	Increased risk of heat exhaustion and heat stress for site workers, potentially resulting in injury.	Medium	Medium	Moderate Adverse	Significant
	Low temperatures	Increased risk of hypothermia for site workers, potentially resulting in injury.	Medium	Low	Moderate Adverse	Not Significant

Resource / Receptor	Climate Variable	Description of potential impact	Sensitivity of receptor	Likelihood of impact	Consequence of impact	Significance
	Heavy rainfall / flooding	Heavy rainfall may lead to increased safety risks to site workers as a result of localised flooding, potentially resulting in injury.	Medium	Medium	Moderate Adverse	Significant
	Drought	Insufficient water due to prolonged dry conditions may reduce availability and / or efficacy of dust suppression techniques, leading to respiratory impacts.	Low	Low	Moderate Adverse	Not Significant
		Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.	High	Low	Very Large Adverse	Significant

8.8 Additional Mitigation and Enhancement Measures

- 8.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 8.7.
- 8.8.2 At the time of writing, no additional mitigation and enhancement measures have been identified for implementation other than those listed in Table 8-11. However, as the Climate Resilience assessment progresses, any additional mitigation and enhancement measures identified will be contained within the Environmental Statement.

8.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 8.9.1 A summary of the potential significant effects identified within this preliminary assessment have been set out in Table 8-16.

Table 8-16 – Summary of Potential Significant Impacts Identified within the Preliminary Climate Resilience Assessment

Receptor / Resource	Sensitivity	Project Phase	Description of Potential Impact / Change	Duration	Mitigation Measures	Potential Significant Effect
Human Health (e.g. site workers)	High	Construction	Prolonged drought conditions leading to wildfire	N/A	Construction activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.
	High	Operation	High temperatures	N/A	Maintenance and repair activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Increased thermal impacts on operational workers may lead to overheating, increasing the risk of heat stress or heat exhaustion and potentially resulting in injury.
	Medium	Operation	Heavy rainfall / flooding	N/A	Maintenance and repair activities should not be undertaken during adverse climate conditions.	Heavy rainfall may lead to increased safety risks to operational workers as a result of localised flooding, potentially resulting in injury.
	Medium	Operation	Prolonged drought resulting in wildfire	N/A	Maintenance and repair activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.
	Medium	Decommissioning	High temperatures	N/A	Decommissioning activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Increased risk of heat exhaustion and heat stress for site workers, potentially resulting in injury.
	Medium	Decommissioning	Heavy rainfall / flooding	N/A	Decommissioning activities should not be undertaken during adverse climate conditions.	Heavy rainfall may lead to increased safety risks to site workers as a result of localised flooding, potentially resulting in injury.
	High	Decommissioning	Prolonged drought resulting in wildfire	N/A	Decommissioning activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.
Infrastructure (pipeline and AGIs)	Medium	Operation	High temperatures	N/A	Where possible, external shading (e.g. tree planting) should be implemented to reduce the risk of thermal gain. Landscaping designs should consider using drought-resistant vegetation to reduce die-back and improve soil stability, decreasing the risk of slope instability.	Potential overheating of AGIs resulting in structural damage and cracking/warping of fabric, requiring repairs.
	Medium	Operation	Heavy rainfall / flooding	N/A	Flood barriers, including temporary barriers such as sandbags, should be provisioned at AGIs. Emergency response plans should be developed and regularly tested to ensure that staff are equipped to address any pipeline damages that may arise from climate hazards swiftly and effectively.	Extreme precipitation may overwhelm drainage infrastructure, resulting in surface flooding and damage to AGIs. Saturation of soils may reduce ground stability, particularly when preceded by prolonged dry conditions, potentially resulting in landslides and damages to the pipeline and AGIs.

Receptor / Resource	Sensitivity	Project Phase	Description of Potential Impact / Change	Duration	Mitigation Measures	Potential Significant Effect
Infrastructure (e.g. access roads and pavements)	High	Operation	Heavy rainfall / flooding	N/A	Additional post-construction drainage should be installed where necessary to ensure that any existing drainage infrastructure impacted by the construction process remains operational.	Heavy precipitation may overwhelm drainage infrastructure and lead to surface flooding, blocking access to the pipeline and AGIs and preventing access for routine or emergency maintenance.
Landscape (e.g. hedgerows and planting)	Medium	Operation	High temperatures	N/A	Landscaping designs should consider using drought-resistant vegetation to reduce die-back and improve soil stability, decreasing the risk of slope instability arising from variable precipitation rates.	The landscape design may be compromised if vegetation is not resilient to increasing temperatures. This may in turn reduce soil stability, increasing the risk of ground movement and damages to the pipeline and AGIs.
	Medium	Operation	Drought	N/A	Landscaping designs should consider using drought-resistant vegetation to reduce die-back and improve soil stability, decreasing the risk of slope instability arising from variable precipitation rates.	The landscape design may be compromised if vegetation is not resilient to drought. This may in turn reduce soil stability, increasing the risk of ground movement and damages to the pipeline and AGIs.

8.10 Next Steps

Design Development

- 8.10.1 As the design continues to progress, further information on design mitigation will become available. Design mitigation will be informed by industry best practice and design standards, considering the climate-related risks identified throughout the assessment process.
- 8.10.2 The Climate Resilience team will liaise with other relevant disciplines to identify design, and mitigation measures relevant to improving climate resilience.

Engagement

- 8.10.3 Engagement with the local authorities listed in Table 8-3 will be undertaken in regard to Climate Resilience throughout the assessment process.

Surveys

- 8.10.4 No surveys are required to complete the Climate Resilience assessment.

In-Combination Climate Impacts Assessment

- 8.10.5 The ICCI assessment will be completed once chapters have been completed for other disciplines.

8.11 References

- Ref 8.1 – UK Government (2019). The Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: <https://www.legislation.gov.uk/ukdsi/2019/9780111187654>
- Ref 8.2 – HM Government (2017). The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Available at: <https://www.legislation.gov.uk/uksi/2017/572/contents>
- Ref 8.3 – United Nations (2023). The Paris Agreement. [online] United Nations Climate Change. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement>
- Ref 8.4 – Department for Energy Security and Net Zero (2023) Overarching National Policy Statement for Energy (EN-1). Available at: <https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf>

- Ref 8.5 – IEMA (2020) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation. Available at: <https://www.iema.net/media/mabhqino/iema-eia-climate-change-resilience-june-2020.pdf>
- Ref 8.6 – Met Office (2018) UK Climate Projections 2018. Available at: <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>
- Ref 8.7 – Department for Energy Security and Net Zero (2023) National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) <https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf>
- Ref 8.8 – Ministry of Housing, Communities and Local Government (2023) National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/media/669a25e9a3c2a28abb50d2b4/NPPF_December_2023.pdf
- Ref 8.9 – Gouldson A, Harcourt R, Lock K, Duncan A and Sudmant A (2021) Yorkshire and Humber Climate Action Plan, Yorkshire and Humber Climate Commission and ESRC Place-based Climate Action Network. Available at: <https://yorksandhumberclimate.org.uk/sites/default/files/Climate%20Action%20Plan.pdf>
- Ref 8.10 – Invest Humber (n.d.) Humber Vision 2030. Available at: <https://investhumber.com/documents/HED-Brochure.pdf>
- Ref 8.11 – East Riding of Yorkshire Council (2022) East Riding Climate Change Strategy 2022-2030. Available at: <https://cape.mysociety.org/media/data/plans/east-riding-of-yorkshire-council-8bd6a5e.pdf>
- Ref 8.12 – North Yorkshire Council (2023) North Yorkshire Council Climate Strategy 2023-2030 (2023). Available at: <https://cape.mysociety.org/media/data/plans/east-riding-of-yorkshire-council-8bd6a5e.pdf>
- Ref 8.13 – North Lincolnshire Council (n.d.) A Green Future: Our Strategy. Available at: <https://www.northlincs.gov.uk/your-council/a-green-future/our-strategy/>
- Ref 8.14 – North East Lincolnshire Council (2018) Local Plan 2013 to 2032. Available at: <https://www.nelincs.gov.uk/assets/uploads/2018/05/20180518-AdoptedLocalPlan2018-WEB.pdf>
- Ref 8.15 – Selby District Council (2022) Local Plan. Available at: <https://democracy.selby.gov.uk/documents/s16614/Appendix%201%20Publication%20Local%20Plan.pdf>

- Ref 8.16 – East Riding of Yorkshire Council (2025) East Riding Local Plan Update 2020-2039. Available at: <https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/east-riding-local-plan-update/>
- Ref 8.17 – North Lincolnshire Council (2011) North Lincolnshire Local Development Framework Core Strategy. Available at: <https://www.northlincs.gov.uk/planning-and-environment/planning-policy-local-development-framework/#1591178700859-b856fc83-069c>
- Ref 8.18 – Met Office (2018) Variables from HadUK-Grid over UK for monthly, seasonal or annual data. Available at: https://ukclimateprojections-ui.metoffice.gov.uk/products/form/LS6_Subset_01

9 Greenhouse Gases

9.1 Introduction

- 9.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) of Greenhouse Gases undertaken to date of the Humber Carbon Capture Pipeline (HCCP) Project ('the Project'). The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 9.1.2 The chapter describes the likely effects of the Project on climate, in particular the magnitude of Greenhouse Gases (GHGs) emissions emitted during both construction and operation. The chapter describes the standards and methodology used, the datasets that have informed the preliminary assessment, presents the baseline conditions, and assesses potential impacts, mitigation measures and residual effects that could result from the Project.
- 9.1.3 The East Coast Cluster is a significance contributor of the UK Statutory carbon budgets 5 and 6, as well as the longer-term net zero target. The Pipeline is expected to transport up to 17 million tonnes of carbon dioxide per year to storage. Despite the Project's key aim to facilitate carbon capture as part of the wider East Coast Cluster, in line with the principles of the EIA and the Project scope, the activity of carbon capture, and therefore the benefit of carbon removal, is not within the scope of the works.
- 9.1.1 This chapter should be read in conjunction with the following chapters:
- Chapter 8: Climate Resilience provides an assessment of the resilience of the Project to climate change, including mitigation.
 - Chapter 16: Traffic and Transport provides the traffic scenarios arising from construction and operation to inform the calculation of GHG emissions from transport.
 - Chapter 17: Materials and Waste provides a description of materials required during construction, as well as the wastes generated. This is used to inform the calculation of GHG emissions from materials.
 - Chapter 18: Hydrology and Land Drainage, for potential flood risks as a result of climate change.
- 9.1.4 The Project's carbon footprint is reported in carbon dioxide equivalents (CO₂e) allowing for the emissions of the six key GHGs: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride.

These are expressed in terms of their equivalent global warming potential in mass of CO₂e.

9.1.5 There are no figures which support this chapter.

9.1.6 There are no appendices which support this chapter.

9.2 Legislation, Policy and Guidance

Legislation

9.2.1 Legislation relevant to GHGs is detailed in Table 9-1..

Table 9-1 – Summary of Legislation relevant to GHGs

Legislation	How it is considered within this PEIR
Paris Agreement (United Nations, 2015) (Ref 9.1)	This is a global climate accord designed to restrict the rise in global temperatures to well below 2° Celsius, and to pursue efforts to limit to 1.5° Celsius above pre-industrial levels. This international treaty aims to meet the climate targets first introduced in the 1997 Kyoto Protocol. The Paris Agreement supersedes the Kyoto Protocol. The PIER reports the likely GHGs arising from the Project and any mitigation considered. The Environmental Statement (ES) will then record and report the anticipated GHG emissions arising from the Project after mitigation, reporting how this impacts the local authority's projection towards Paris Agreement commitments.
The Climate Change Act 2008 as amended by The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref 9.2)	The amended Climate Change Act establishes a framework for the UK to achieve its long-term objective of reducing GHG emissions by 100% from a 1990 baseline by 2050. This is facilitated through interim targets set by the UK Carbon Budgets. The sequential carbon budgets provide a five-year statutory cap on total GHG emissions required to meet the UK's emission reduction commitments. • We are currently in the period of the fourth carbon budget for 2023-2027, which is 1,950 MtCO₂e. • The fifth carbon budget (2028-2032) is set at 1,725 MtCO₂e. • The sixth carbon budget (2033-2037) is set at 965 MtCO₂e. • In February 2025, the seventh carbon budget was recommended by the Climate Change Committee as 535 MtCO₂e, covering the period of 2038 to 2042. These carbon budgets will form the future baseline against which the significance of the Project's impacts will be assessed. The preliminary assessment is presented within this chapter, and a final assessment will be presented within the ES.

Policy

National Planning Policy

9.2.2 National Planning Policy relevant to GHGs is detailed in Table 9-2.

Table 9-2 – Summary of National Planning Policy relevant to GHG

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Overarching National Policy Statement for Energy EN-1 (Ref 9.3)		
Section 5.3	“All proposals for energy infrastructure projects should include a GHG assessment as part of their ES. This should include: A whole life GHG assessment showing construction, operational and decommissioning GHG impacts, including impacts from change of land use”	The full GHG assessment will be undertaken as part of the Environmental Statement, when full data will be available, considering the Whole Life Carbon (WLC) of the assessment as applicable. The scope will follow that set out within EN-1. This will include the embodied carbon from the construction phase, carbon associated with the energy consumed during the operational phase and carbon arising from the removal or addition of land types sequestering carbon. This PEIR chapter presents the preliminary results of the key elements considered.
	The ES should also include “An explanation of the steps that have been taken to drive down the climate change impacts at each of those stages”	Embedded mitigation measures will be assessed as part of this chapter. This will be considered in the assessment of significance. This GHG assessment will be used to inform further reduction measures to ensure emissions are minimised as far as practical.
	The ES should also include “How reduction in energy demand and consumption during operation has been prioritised in comparison with other measures... and how operational emissions have been reduced as much as	Emissions arising from operational energy demand will be assessed as part of the GHG chapter of the ES, with any mitigation considered. This PEIR chapter sets out

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	possible through the application of best available techniques for that type of technology.”	what will be considered in the scope of the ES and the embedded mitigation.
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines EN-4 (Ref 9.4)		
Section 2.9.24	“The ES should include an assessment of the effects of gas emissions on greenhouse gas emissions” Gas emissions refer to the need to flare or vent gas.	The process of cleaning and inspecting the pipeline will be completed periodically, a process which may involve venting small volumes of carbon dioxide. This is scoped into the assessment of GHGs and will be assessed during the ES when information is available. The detail required for the assessment is not available at the time of this PEIR.
NPPF (Ref 9.5)		
Chapter 14	The Policy includes the requirements for local authorities to adopt proactive strategies to mitigate and adapt to climate change in line with the provisions and objectives of the Climate Change Act 2008 and co-operate with other authorities to deliver strategic priorities which include climate change.	The mitigation of GHG emissions is assessed within this chapter to determine the significance of the emissions produced throughout the whole life of the Project.

Local Planning Policy

- 9.2.3 The Project lies within the jurisdictions of North Yorkshire, East Riding of Yorkshire, North Lincolnshire and North East Lincolnshire.
- 9.2.4 Local Planning Policies relevant to GHGs are detailed in Table 9-3.

Table 9-3 – Summary of Local Planning Policy relevant to GHGs

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
The Humber Vision 2030 (Ref 9.6)	N/A	The Humber Vision 2030 is a joint strategy to decarbonise the Humber Industrial Cluster, which releases the most CO₂ of all industrial clusters in the UK. The policy seeks to set out a pathway for investing in net zero technologies and raise the Humber region's profile as a global net zero leader. The vision sets out how the Humber region will lead in GHG removals technology.	This is for information only and does not make any commitments for the GHG assessment.
Yorkshire & Humber Climate Action Plan (2024) (Ref 9.7)	N/A	The plan contains a regional target of reduction to net zero by 2038 from the baseline year of 2000. Carbon capture and storage through planting trees or new carbon capture and storage technologies is considered however, the Action Plan stresses that the first option has to be to minimise emissions. The Humber Industrial Cluster, responsible for 33% of regional emissions, plans to become 'carbon negative' by 2040. Regional targets will be set to support the Net Zero by 2038 target.	This PEIR chapter reports the carbon reduction targets that will be taken into consideration when determining if the Project has significant effects on GHG emissions.
East Riding of Yorkshire Climate Strategy 2022 - 2030 (Ref 9.8)	N/A	The Climate Change Strategy 2022-2030 sets out how the East Riding of Yorkshire will achieve short term decarbonisation targets. By 2030, a 40% reduction in transport emissions, 58% reduction in building emissions and 64% reduction in industrial emissions are targeted.	This PEIR chapter identifies potential mitigation measures, such as minimising construction and operational traffic emissions, through measures such as streamlining the delivery programme and using low carbon vehicles in line with the Climate Change Strategy.
North Yorkshire Council Climate Change Strategy 2023 – 2030 (Ref 9.9)	Key Theme 1: Mitigation	<i>"We will work with partners to help to achieve the shared ambition that the region is net zero by 2034 and carbon negative by 2040."</i> The Climate Change Strategy sets out how North Yorkshire Council will respond to the climate emergency by reducing GHGs, improving resilience, and supporting nature. Key Theme 1: Mitigation details how the council will reduce GHG emissions: • Low-energy and low-carbon built environment powered by renewable energy; • Easy, accessible, and affordable low carbon transport; • A low waste and circular economy; and • Making the most of our land to store carbon.	This chapter outlines how carbon emissions produced from the Project will be mitigated through reducing demand for natural resources and transport. Waste will be managed in accordance with the waste hierarchy where feasible.
North Lincolnshire A Green Future: Our Strategy (Ref 9.10)	4. Clean and affordable energy	The North Lincolnshire Council's Strategy is based on four key themes: • Net Zero and Sustainable Energy. • Resources, Waste and Water Management. • Our Natural Environment: People and Place. • A Shared Responsibility and A Shared Vision.	North Lincolnshire Council requested that the assessment of GHGs considered the impact of loss of land, both temporary and permanent, from carbon sequestration. Carbon sequestration is a key part of the local plan for this region. Land use and land use change is scoped into the GHGs assessment, which will be assessed in the ES Chapter.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		The themes include targets to invest in carbon capture and sequestration, improve biodiversity and manage habitats, and introduce mitigation measures to reduce flood risk.	
North East Lincolnshire Local Plan 2013 to 2032 (Ref 9.11)	Strategic Objective 2 (SO2) Policy 31	The local plan Strategic Objective 2 (SO2) addresses Climate Change, promoting development that minimises natural resource and energy use, reduces waste and encourages recycling, promotes opportunities for sustainable transport use and incorporates sustainable construction practices. Renewable and Low carbon infrastructure: Promotes development that supports renewable and low carbon energy sources.	The chapter will quantify the estimated GHG emissions arising from the Project in construction and operation, considering mitigation aligning with the carbon reduction hierarchy, the waste hierarchy and energy hierarchy. This PEIR chapter outlines the emissions scope, where expected arisings will occur.
North East Lincolnshire Local Plan 2013 to 2032 (Ref 9.11)	Policy 32	Energy and low carbon living: States that applications for major development should demonstrate how appropriate design and construction practices have been considered and how design has incorporated the use of materials, both in terms of embodied carbon and energy efficiency.	The ES chapter will quantify the estimated GHG emissions arising from the Project in operation, considering mitigation to reduce energy in use. This PEIR chapter outlines the emissions scope and key mitigation.

Guidance

- 9.2.5 The assessment of 'the likely effects' of the Project on climate, in particular the magnitude of GHGs emissions emitted during both construction and operation has been carried out in accordance with the following guidance:
- Assessing Greenhouse Gas Emissions and Evaluating their Significance (Ref 9.12). The IEMA Guide for 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' assists with GHG emissions assessments, mitigation and reporting in statutory and non-statutory Environmental Impact Assessment (EIA).
 - PAS 2080:2023 Carbon Management in Buildings and Infrastructure (Ref 9.13). PAS 2080:2023 provides a consistent framework for managing carbon throughout the lifecycle of infrastructure assets, promoting collaboration across the value chain and driving a culture of sustainable practices.
 - Royal Institute of Chartered Surveyors (RICS) Whole Life Carbon Assessment for the Built Environment (RICS, 2023) (9.14). The document sets out the technical methodology for assessing carbon impacts from buildings and infrastructure assets throughout their life cycle. It is designed to enhance the quality, comparability, and accuracy of data used and derived from whole life carbon assessments and provides best practice guidance for calculating and reporting carbon emissions.

9.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 9.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined below

Table 9-4 – Summary of Scoping Opinion relevant to GHGs

Section Reference	Matter	Comments	Response
ID 3.2.1	Carbon dioxide venting	The Scoping Report notes that venting activities would release small amounts of carbon dioxide and is considered a climate issue, rather than air quality. The Inspectorate agrees this matter can be scoped out of the air quality assessment on the basis it is assessed in the Climate Change, Adaptation and Resilience chapter of the ES.	Permanent venting is a result of the capture of carbon, which is not considered as part of this Project. Since the Scoping Report, the Climate Change, Adaptation and Resilience chapter has been divided into Chapter 8: Climate Resilience, and this chapter.
ID 3.4.1	Venting at Easington	The Scoping Report states that although Easington will have a permanent vent, venting would only occur during unplanned emergency events. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.	There has been a change to venting at Easington. It is now expected that CO ₂ leakage from the pump seals will occur constantly at low levels. This carbon released is either expected to be captured and re-injected into the stream or released to the atmosphere at a safe location and height after dilution. The Project scope details that the activity of carbon capture is not within the scope of the works. Therefore, it is considered that venting is scoped out.
ID 3.4.2	Greenhouse gas emission – pre-	The Scoping Report confirms that demolition of existing structures is not anticipated. On	Noted.

Section Reference	Matter	Comments	Response
	construction / demolition phase	this basis, the Inspectorate agrees this matter can be scoped out of the ES.	
ID 3.16.5	Inter-project effects – GHG emissions	The Inspectorate agrees that a cumulative effects assessment of GHG emissions can be scoped out of the ES, based on the explanation provided in Table 20-4 of the Scoping Report.	Noted.
ID 3.4.5	Greenhouse gas (GHG) emissions arising from disturbance of landfill sites and other sources of ground gas	Paragraphs 9.8.20 and 9.8.21 of the Scoping Report confirm that historic landfills and potential sources of ground gas have been identified within the study area. If the pipeline route cannot avoid these sites, the potential to increase, or give rise to, GHG emissions from these sites during construction should be included in the assessment.	Historic landfills with uncertain location may be disturbed by the construction of the pipelines. An event of disturbance to historic landfills is not expected to release buried GHGs, as GHGs in untreated landfills are released continuously rather than trapped. Chapter 10: Ground Conditions and Hydrogeology details a review of historical and active landfills within the draft Order Limits. Any landfills that directly interact with the Project have been discussed in the Current Potentially Contaminative Land Uses for each respective section of the route. Rawcliffe South, Barrow Grange, and Eastfield Road are historical landfills partially or fully within the draft Order Limits.

Section Reference	Matter	Comments	Response
			A further investigation on the possible climate outcomes of digging into historic landfills will be conducted as part of the full ES.
Environment Agency Appendix 1	PINS 31/01/2025	With regards to the phrase Beneficial “with a positive climate impact.” - we question the inclusion of this phrase. None of the other categories refers to climate and we consider it will be very difficult to evidence demonstrable changes to climate that may arise from carbon capture attributable to this Project.	Noted, this will not be detailed.
Environment Agency Appendix 1	Design life	This section notes that the design life of the pipeline is 25 years although the Endurance Store has a capacity to store carbon far beyond this period. From a planning perspective the design life for non-residential development should be considered as 75 years. Recommendation: The lifetime for non-residential development from a climate change perspective should be considered as 75 years as a starting point.	The PEIR will consider a 25 year design life for the assessment of operational emissions. A 75-year design life will be considered for the Climate Resilience Chapter. After 25 years, the Project and all components will be checked and the Project need assessed. A decision will then be made on whether the Project will continue operating or be decommissioned.

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Summary of Engagement

- 9.3.2 No specific engagement has been undertaken in relation to GHGs with the relevant local authorities at the time of writing.

9.4 Assessment Methodology

Baseline Data

Study Area

- 9.4.1 The Study Area for the construction phase of the assessment considers emissions associated with construction-related activities, material resources and waste and their associated transport. Therefore, the Study Area comprises the draft Order Limits and the geographical area covered by the transport of waste, material resources and construction workers to and from the Project.
- 9.4.2 The assessment of GHGs during the operational phase of the Project considers maintenance, repair, refurbishment and any operational energy required over the 25-year design life.
- 9.4.3 The assessment of GHGs during the decommissioning phase of the Project considers emissions associated with decommissioning-related activities, material resources, and waste and their associated transport. Therefore, the Study Area comprises the Project boundary and the geographical area covered by the transport of waste, material resources, and decommissioning workers to and from the Project.

Baseline Data Collection

- 9.4.4 The current baseline represents existing GHG emissions prior to the construction and operation of the Project. The baseline is considered a reference point for Business as Usual against which the Project can be measured, providing a GHG emissions assessment within the Study Area but without the development occurring.

Desk Study Sources

- 9.4.5 Baseline conditions of the Project were established during a desk study using the following sources:
- The current baseline GHG emissions have been collected for the Yorkshire and Humber Region, using the UK local authority and regional GHG emissions statistics (Ref 9.15). The most recent published data is for a baseline year of 2023.

- The future baseline of GHG emissions uses the UK Government Carbon budgets (Ref 9.16).
- The future baseline also considers the Tyndall Centre for Climate Change Research (Ref 9.17).

Site Visits and Surveys

- 9.4.6 No Site visits or surveys were required as part of the assessment of GHGs.

Impact Assessment Methodology

- 9.4.7 The Project is a key part of the wider East Coast Cluster, which is decarbonising through carbon capture technology. The purpose of the Project is to enable the transportation of carbon to a carbon store; however, the eventual carbon capture and storage is not within the scope of the works. Therefore, the residual effect of the carbon capture is not be assessed within the EIA.

Sensitivity

- 9.4.8 The consequences of a changing climate have the potential to lead to significant environmental effects on all impact areas in the EIA Directive. GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit. Therefore, any GHG emissions or reductions might be considered significant. The significance of the Project's emissions will be considered over its lifetime, including mitigation applied to reduce emissions.
- 9.4.9 As GHG emissions are not defined by geographical boundaries, the global atmosphere is the key receptor of the GHGs assessment. All global cumulative GHG sources are relevant to the effect on climate change, and this should be taken into account in defining the receptor (the atmospheric concentration of GHGs) as being of '**high**' sensitivity to further emissions.
- 9.4.10 To meet the 2050 carbon reduction target and interim budgets, action is required to reduce GHG emissions from all sectors. The assessment will consider whether and how the Project will contribute to the achievement of these targets. The Project's impact will be assessed through consideration of Project emissions in the context of the UK Carbon Budgets, progress towards net zero by 2050 with at least a 78% reduction by 2035 (Ref 9.2).

Magnitude of Effect

- 9.4.11 The impact of increased GHG emissions from the Project will be considered in conjunction with the embedded mitigation measures, to assess whether it

contributes to reducing GHG emissions relative to the baseline consistent with a trajectory towards net zero by 2050.

- 9.4.12 The magnitude of emissions will be considered in the context of the sector emissions, regional carbon budgets, the UK national carbon budgets and net zero trajectory and policies. RICS Whole Life Carbon methodology (Ref 9.14) allows emissions representing less than 1% of total project emissions to be excluded from reporting. Therefore, it is considered that emissions equating to <1% of carbon budgets are considered negligible. A scale is then applied to further emissions, as listed in Table 9-5.
- 9.4.13 The magnitude of impact will be considered as the change experienced from the current baseline conditions to the future conditions with the Project implemented. The magnitude of impact on the receptor has been considered on a scale of high, medium, low or negligible. As no agreed significance criteria is available for evaluating GHG emissions in EIA, the magnitude of change is determined by establishing the percentage change relative to the baseline GHG emissions from the local area.

Table 9-5 – Magnitude of Impact

Magnitude of impact (change)		Description
High	Adverse	A large increase in GHG emissions (>10%) relative to baseline emissions and / or future carbon budgets
	Beneficial	A large decrease in GHG emissions (>10%) relative to baseline emissions and / or future carbon budgets
Medium	Adverse	A medium increase in GHG emissions (5% – 10%) relative baseline emissions and / or future carbon budgets
	Beneficial	A medium decrease in GHG emissions (5% – 10%) relative baseline emissions and / or future carbon budgets
Low	Adverse	A small increase in GHG emissions (1% – 5%) relative to baseline emissions and / or future carbon budgets
	Beneficial	A small decrease in GHG emissions (1% – 5%) relative to baseline emissions and / or future carbon budgets

Magnitude of impact (change)		Description
Negligible	Adverse	A negligible increase in GHG emissions (<1%) relative to baseline emissions and / or future carbon budgets
	Beneficial	A negligible decrease in GHG emissions (<1%) relative to baseline emissions and / or future carbon budgets

9.4.14 The magnitude of GHG emissions emitted as a result of the Project will be quantified by assessing the activities associated with construction, operation and decommissioning. Activity data and emission factors will be used where appropriate, including the material specifications, energy demand and transportation.

9.4.15 The GHG assessment will be reported in the form of the 'carbon footprint' - reported in tonnes of carbon dioxide equivalent (tCO_{2e}).

Significance

9.4.16 The assessment of significance is based on professional judgement and is derived from receptor sensitivity and magnitude of impacts. The receptor's sensitivity to further emissions is high because of the severe consequences of global climate change and the cumulative contributions of all GHG emissions.

9.4.17 The significance of effects is assessed by comparing the estimated GHG emissions arising from the Project with the future baseline and the associated reduction targets.

9.4.18 Mitigation measures are considered when determining the magnitude of emissions. Mitigation measures encompass all actions committed to for the reduction of GHG emissions.

9.4.19 To meet the UK's 2050 carbon reduction target and interim budgets, action is required to reduce GHG emissions from all sectors. The Project PEIR and ES will therefore consider whether and how the Project will contribute to the achievement of these targets. The Project will be assessed in consideration of the UK Carbon Budgets, keeping on track towards net zero by 2050 with at least a 78% reduction by 2035 (Ref 9.2). It shall also consider the local GHG emission targets of Yorkshire and Humber reaching net zero by 2038 (Ref 9.7).

9.4.20 When evaluating significance, all GHG emissions contribute to a negative environmental impact. The significance of the Project should be determined by

the net impact over its life. Where GHG emissions cannot be avoided through mitigation, efforts to reduce the residual emissions will aim to be made throughout the lifetime of the Project. Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the Project's remaining emissions will be considered.

- 9.4.21 Table 9-6 outlines the measure of significance from IEMA guidance (Ref 9.12), which will be based on professional judgement.

Table 9-6 – Significance Criteria

Measure of Impact	Description
Major adverse	The Project's 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 for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate adverse	The Project's 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 for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Minor adverse	The Project's GHG impacts will be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	The Project's GHG impacts will be 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. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.

Measure of Impact	Description
Beneficial	The Project's 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. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

Assumptions and Limitations

- 9.4.22 At the time of writing of this chapter, the Project design is still in development, and the required data is not yet available for assessment of GHGs. Therefore, modelling has not been undertaken. Any further assumptions and limitations encountered during the assessment process will be detailed within the ES.
- 9.4.23 Uncertainty arising from the quality of data provided to quantify emissions arising from the Project, study boundaries and period of assessment, cannot be completely eliminated from an assessment. It's understood that as design progresses, so too does the accuracy of the information available and the GHG emissions assessment.
- 9.4.24 The assessment of GHG emissions will be as accurate as possible based on the data available at the time of the assessment. Where information is not available, assumptions based on professional judgment will be made. These assumptions will be consistent with those made by other topics for their assessments presented within the ES using industry guidance relevant to the scale of the Project.
- 9.4.25 The most up to date data sources at the time of the assessment will be used. The assessment is limited by the quality of data, for example where projections of UK grid decarbonisation will be used. Inclusions and exclusions will be explicit during the ES process.

9.5 Baseline Conditions

Existing Baseline

- 9.5.1 A baseline desk study has been undertaken utilising data from publicly available sources to provide information on GHG emissions in the Project location.

- 9.5.2 For the purpose of assessment, emissions that are subject to change as a result of the Project are used as the baseline. This is defined as those emissions resulting from Industrial and Commercial processes in the Yorkshire and Humber region. The region is the UK's largest GHG contributor, emitting 9.4% of the UK's GHGs.
- 9.5.3 UK local authority and regional GHGs emissions statistics: 2005-2023 (Ref 9.15) was used to determine the baseline emissions of the Yorkshire and the Humber region.

Table 9-7 – Baseline tCO₂e Emission Sources for the Humber Region

Emission Source	2023 Emissions - tCO ₂ e
Industry	8,978,100
Commercial	2,227,200
Public Sector	832,300
Domestic	6,438,400
Transport	9,704,500
Land Use, Land Use Change, Forestry	27,000
Agriculture	3,396,300
Waste	1,694,000
Total	33,297,800

- 9.5.4 A total of 33,297,800 tCO₂e of GHG emissions are reported for the Yorkshire and Humber region in 2023. The Industrial source alone emits around 8,978,100 tCO₂e per annum, with commercial processes contributing a further 2,227,200 tCO₂e per annum.
- 9.5.5 The combined industrial and commercial processes emissions, totalling 11,205,300 tCO₂e, acts as the baseline for annual GHG emissions in the Humber region.

Land Use

- 9.5.6 Current land use within the draft Order Limits is predominantly agricultural, with some, commercial and industrial areas. Other assets include highways, rail, canals, and existing pipeline infrastructure, along with environmental attributes such as rivers and wooded and other heavily vegetated areas.

Future Baseline

- 9.5.7 GHG emissions are expected to decrease in future years due to legislation and policy, including the UK Carbon Budgets. The future baseline describes the reasonably foreseeable business-as-usual (BAU) conditions that are anticipated in the future without implementation of the Project.
- 9.5.8 The UK carbon budgets are effectively a future baseline of national GHG emissions necessary to achieve net zero. The Climate Change Act 2008 sets a 100% carbon reduction target (net zero) by 2050 (Ref 9.2). Emissions aligned with the UK's five-year Carbon Budgets are used as an indicator of likely future baseline GHG emissions.
- 9.5.9 The UK's Seventh Carbon Budget (2038-2042) was recommended by the Climate Change Committee in February 2025 and will be accepted or rejected in June 2026 (Ref 9.18). It is, therefore, presented as a provisional budget for this report.

Table 9-8 – UK Carbon Budgets to 2042

Carbon Budget Period	UK Carbon Budget (tCO ₂ e)
2023-2027	1,950,000,000
2028-2032	1,725,000,000
2033-2037	965,000,000
2038-2042	535,000,000

- 9.5.10 The Tyndall Centre for Climate Change Research have calculated carbon budgets for each of the local authority areas in the UK (Ref 9.17). This helps local authorities understand the contribution they must make towards the Paris Climate Change Agreement. The carbon budget sets out the maximum amount of carbon dioxide that can be emitted in a local area to limit global warming to 1.5 degrees compared to pre-industrial levels.
- 9.5.11 A recommended Climate Commitment is set for Yorkshire and the Humber by the Tyndall Centre, providing budgets for CO₂e emissions and from the energy system for 2020 to 2100. The region must stay within a maximum cumulative carbon budget of 220.7 million tonnes (MtCO₂e) for the period of 2020 to 2100. In order to do this, the Tyndall Centre recommend reaching zero carbon emissions no later than 2041.

- 9.5.12 Table 9-9 presents the Yorkshire and the Humber energy CO₂e budget in the format of the 5-year carbon budget periods in the UK Climate Change Act.

Table 9-9 – Carbon Budgets for the Yorkshire and Humber region

Carbon Budget Period	Recommended Carbon Budget (Mt CO ₂ e)
2023 - 2027	73.5
2028 - 2032	35.8
2033 - 2037	17.5
2038 - 2042	8.5
2043 - 2047	4.2
2048 - 2100	3.9

9.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 9.6.1 The first stage in reducing carbon is to minimise the material use across the Project. A key mitigation measure would therefore be to reduce the length of the pipeline route, reducing the quantity of steel and other key materials.
- 9.6.2 Tender and contractual documentation, including procurement documentation, will influence mitigation. For example, specification of steel that has lower embodied carbon, including high recycled content, will influence the release of emissions.
- 9.6.3 Tertiary mitigation will be managed through the use of the Construction Environmental Management Plan (CEMP), which will detail management of GHG emissions and application of mitigation measures during construction.
- 9.6.4 The CEMP will detail the environmental controls, environmental protections and environmental safety measures that will be adopted during construction. The CEMP will set out a series of standard best practice measures to control the environmental effects of the construction of the Project.

- 9.6.5 This includes the following principles:
- Sustainable resource management:
 - Stating clear preference in tender documents for more sustainable materials, products with reduced embodied emissions, and materials with higher proportion of recycled content, provided that use of such resources does not impede on the safety and integrity of the Project.
 - Design out waste, following the waste hierarchy and using modular construction where possible.
 - Source materials locally, prioritising local suppliers to minimise transport emissions.
 - Use sustainable construction methods, including energy efficient plant, sustainable fuel alternatives and minimise machine idling:
 - Using more efficient construction plant and transport vehicles, preferably those powered by electricity using alternative / low-emission fuel sources.
 - Putting in place training policies and management protocols to avoid fuel spills and idling engines and promote environmentally sensitive driving techniques.
- 9.6.6 During operation, further measures to reduce emissions arising from operational energy or maintenance activities include:
- Designing, specifying, and constructing the Project to maximise the operational lifespan and minimise maintenance and refurbishment needs through material selection.
 - Using best-practices in energy efficiency and using low / no-carbon plant and equipment when undertaking operation, maintenance, and refurbishment. This may include the use of more efficient and / or electrically powered plant and vehicles, more sustainable materials, and training for environmental sensitivity.
 - Implementing a leak detection and maintenance programme.
- 9.6.7 During decommissioning, prioritising the waste hierarchy principles to reuse and recover materials will mitigate emissions.
- 9.6.8 Secondary mitigation intended to reduce embodied carbon during construction and operation, such as using low carbon materials, lean structural design, and energy efficiency measures will be explored further as the design develops.

The Project is committed to reducing GHG emissions by implementing the following hierarchy for GHG emissions, in line with PAS 2080 (Ref 9.13):

- Avoid and / or prevent – measures that maximise potential for reusing and / or refurbishing existing assets.
- Reduce – measures that apply low carbon solutions, including technologies, materials and products, to minimise resource consumption.
- Remediate – measures to further reduce carbon through on or offsite offsetting or sequestration.

Embedded Mitigation

Current embedded mitigation measures are outlined in Table 9-10.

Table 9-10 – Embedded Mitigation

Ref	Measure	Project phase	Responsible party
GG1	Construction Environmental Management Plan	Construction	Contractor
GG2	Sustainable resource management: • Selecting low carbon materials where applicable. • Prioritise materials with recycled content. • Design out waste, following the waste hierarchy and using modular construction where possible.	Construction	Contractor
GG3	Where possible, source materials locally, prioritising local suppliers.	Construction	Contractor
GG4	Where applicable, use sustainable construction methods, including energy efficient plant, sustainable fuel alternatives and minimise machine idling.	Construction	Contractor
GG5	Site Waste Management Plan	Construction	Contractor
GG6	Sustainable resource management (including designing out waste) in the context of the Waste Hierarchy, which promotes prevention, reuse,	Construction, End of Life	Contractor, Asset owner

Ref	Measure	Project phase	Responsible party
	recycling and recovery of waste before considering disposal.		
GG7	The Proximity Principle, where waste is ideally managed as close to the source of generation as is practicable.	Construction, End of Life	Contractor, Asset owner

9.7 Preliminary Assessment of Potential Impacts

9.7.1 At the time of writing, estimated quantities of materials required for construction are unavailable, therefore it is not possible to quantify the GHG emissions arising from the Project. Any potential impacts identified from use of construction materials will be detailed within the ES.

9.7.2 The Humber Carbon Capture Pipeline is an essential part of carbon capture and storage in the Humber region and will provide the required onshore captured carbon transportation infrastructure. The carbon dioxide will be stored in geological formations under the North Sea (the Endurance Store and subsidiary stores). The impact of this carbon capture and storage is part of a wider Project, therefore not considered as a potential impact.

9.7.3 Construction, operational and decommissioning phases of the Project will be considered for the GHG assessment.

Construction

9.7.4 GHG emissions sources during construction include material supply, transportation, manufacturing and construction process. Materials anticipated for use during construction of the Project are discussed below.

Pipeline

9.7.5 The pipeline is considered to be the most significant source of emissions due to the quantity of material required. The pipeline comprises:

- Approximately 92 km of carbon steel pipeline, measuring approximately 66 cm in diameter.
- Approximately 29 km of steel pipe for spur lines, at approximately 30 cm in diameter.

- 9.7.6 The majority of the pipeline will be underground at a depth of 1.2 m. Excavated soil will be reinstated.
- 9.7.7 Preliminary carbon emissions associated with the carbon steel have been estimated based on approximate distances of pipework in Table 9-10. The calculation was produced using OneClick LCA, a whole life carbon assessment software.

Table 9-11 – Estimated Embodied Carbon Emissions Arising from Pipework

Element	Quantity (m)	Emission factor	Transport distance ⁹	Emissions from materials	Emissions from transport ¹⁰	Emissions from construction ¹¹
		tCO ₂ e/m	km	tonnes CO ₂ e		
Carbon steel pipeline 660mm	92,000	0.275	120	26,090	145	1,573
Spur lines 300mm	29,000	0.144	120	4,304	24	260
Total tCO ₂ e				30,394	169	1,573

⁹ As the current supplier of steel pipeline is not yet determined, the transport distance is estimated from the RICS WLCA methodology (Ref 9.14) Table 17 – Nationally manufactured scenario.

¹⁰ Transport is assumed to be by HGV with 9 ton capacity. The carbon emission factor is 0.0928 kg CO₂e / ton.km.

¹¹ A waste rate of 6% is assumed based on OneClick LCA standard assumptions. The waste material is assumed to be recycled.

- 9.7.8 The total emissions arising from the pipework, excluding the excavation activity, is expected to contribute 32,381 tCO₂e.
- 9.7.9 Prior to commissioning, hydrostatic testing of the pipeline will be required. Whilst the details of this activity are still being refined, it is anticipated that approximately 16,200 m³ of water would be required for the hydrostatic testing.

Table 9-12 – Estimated carbon emissions arising from hydrostatic testing

Element	Construction activity	Water Quantity	Carbon emission factor ¹² (kg CO ₂ e/kg)	Construction emissions tonnes of CO ₂ e
Water for hydrostatic testing	Mains water (conventionally treated)	16,200	0.0003	4.4

Above Ground Installations (AGIs)

- 9.7.10 The above ground installations (AGIs) are facilities required to operate and maintain the pipeline. All AGIs will have:
- Security fencing up to 2.4 m high.
 - Access tracks up to 4 m wide. Where practicable, existing access tracks would be used. Some may require upgrading, such as widening or levelling, or the installation of passing places. For other locations, new access tracks may be constructed and would typically be of a stone aggregate surfacing, or concrete for short access tracks.
 - An electrical and instrumentation (E&I) unit that would house the necessary equipment for distributing power to the AGI facility.
 - Security and safety lighting to be used as required in the event of maintenance or security breach.
 - A single, small heating, ventilation and air conditioning (HVAC) unit to maintain suitable operating temperature and conditions within the E&I unit. It is anticipated that the HVAC system at each AGI would have a power rating of approximately 3kW.
 - The ground within the AGIs would be surfaced with a combination of concrete surfacing for areas required to support equipment and access, with the remaining area surfaced with crushed aggregate.

¹² Assumed tap water, conventionally treated.

- 9.7.11 The current design shows 13 AGIs, as listed in Section 2.6 of Chapter 2: Project Description.

Pump Facility

- 9.7.12 The Pump Facility would comprise:
- Permanent access track, maximum 6 m wide.
 - Surface water drainage.
 - A single-story administration building and control room (approximately 5 m high).
 - A workshop, approximately 8 m high.
 - A welfare building.
 - Up to five pump electrically driven units each rated 3.75 MW (four would be operational normally, one on standby).

Temporary Works

- 9.7.13 Temporary works will also be required, including the marking out of the route and the temporary construction compounds.

Transport

- 9.7.14 Average HGV movements for the four-year construction programme have been estimated per working day.
- 9.7.15 The works to facilitate the River Humber crossing, if the tunnel methodology is carried out, are anticipated to be a key contributor to the number of construction vehicle movements required by the Project.

Operation

- 9.7.16 Operation of the Project will result in GHG emissions arising from the energy use for regular operation as well as emissions associated with maintenance and refurbishment.

Energy Use

- 9.7.17 During operation, a small HVAC system associated with the E&I kiosk would operate continuously to ensure that the electrical equipment within the kiosk remains at the appropriate operating temperature.

9.7.18 It is anticipated that the power supply for the Pump Facility would be via a connection to the existing Salt End South Substation, as this is the closest substation to the Pump Facility with sufficient capacity. The energy use at the Pump Facility includes:

- Up to five pump electrically driven units each rated 3.75 MW (four would be operational normally, one on standby). The pump units would be approximately 2.7 m high and would be contained within a structure to attenuate the noise emissions. The pump units would also have local vents, to support maintenance activities and unplanned emergency events (see Section 2.7 of Chapter 2: Project Description for further information).
- Up to five carbon dioxide recycle coolers, including pressure relief.
- One emergency diesel generator which is anticipated to be used as back-up power for communications and instrumentation only (i.e. would not operate routinely), should there be issues with receiving electricity from the grid network.
- One Uninterruptable Power Supply system to provide low voltage power to critical control and instrumentation equipment in an unplanned emergency event.
- Lighting which would operate during low-light conditions to allow the on-site workers to undertake their tasks safely and would operate during any security or emergency situations.
- HVAC systems.

Maintenance

9.7.19 The pipelines and associated AGIs will also be regularly maintained.

9.7.20 Once construction is complete and prior to commencing operation, the pipeline would be inspected and cleaned using a Pipeline Inspection Gauge (PIG). At this stage, it is anticipated that additional pigging would be undertaken approximately every five years. This process may involve venting small volumes of carbon dioxide at the Inlet AGIs, Junction AGIs and the Pump Facility, as there would be carbon dioxide within the pipework associated with the PIG launcher / receiver equipment. There may be a requirement for emergency venting at AGIs via a mobile mounted stack.

Transport

9.7.21 During operation, the Pump Facility would be permanently staffed by approximately four people. There may be approximately 19 additional people to temporarily work at the Pump Facility to support key operation and maintenance tasks. This will include activities such as meter calibrations, instrument and electrical routines, grounds maintenance, rigging and lifting of plant, fabric

maintenance and major pump overhaul. Such key operation and maintenance tasks will be scheduled to maximise efficiency, such as potentially being undertaken simultaneously, wherever practicable. Emissions associated with the transport of staff, and maintenance activities, will contribute to the whole life carbon of the Project.

Land Use Change

- 9.7.22 The impact of land use change is anticipated to be minimal, as following the completion of construction works, temporary working areas would be reinstated and all unused construction materials removed.
- 9.7.23 Excavated soil would be reinstated. This would include appropriate ripping of subsoil prior to topsoil placement if compaction has occurred. Topsoil would then be spread in such a way as to ensure that it does not become compacted.
- 9.7.24 Following soil reinstatement, restoration would commence. This would include reseeded of pastureland and reinstatement of field boundaries (e.g., replacement of hedgerow and installation of fences).

Decommissioning

- 9.7.25 Emissions arising from decommissioning and end of life are emitted from deconstruction operations, transport of waste from site, waste processing and emissions related to disposal.
- 9.7.26 Through robust design and operating maintenance regime the pipeline, AGIs and Pump Facility are anticipated to remain operational for the design life (i.e., 25 years) of the asset and potentially longer.
- 9.7.27 When the pipeline reaches the end of its operational life, it would be decommissioned safely. Decommissioning would consider the relevant environmental legislation and technology available at the time and the methods which would result in the least potential adverse environmental impacts.
- 9.7.28 Once decommissioned, it is anticipated that the pipeline would be left in situ (in order to avoid further disturbance to the soil, land use and environmentally sensitive areas) and permanently removed from service. This reduces the GHG emissions arising from decommissioning, as excavation and waste processing will not be required for the pipeline.
- 9.7.29 The AGIs and Pump Facility would be safely dismantled. It is anticipated that the same type of equipment, machinery and traffic routes would be used for the dismantling works as would be used for construction. Following the dismantling works, all equipment would be removed and the land returned to its former use.

9.8 Additional Mitigation and Enhancement Measures

- 9.8.1 At the time of writing, no additional mitigation and enhancement measures have been identified for implementation other than those listed in Table 9-9. However, as the GHGs assessment progresses, any additional mitigation and enhancement measures identified, will be contained within the ES.

9.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 9.9.1 Table 9-13 below summarises the preliminary assessment of potential significant effects associated with the Project. A quantitative assessment will be provided within the ES, assigning significance criteria.

Table 9-13 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
The global atmosphere	High	Construction	Release of emissions arising from material extraction and transportation to place of manufacture, manufacturing, transport of products to site, and construction installation. GHG emissions are likely to arise from: - Steel pipework: Estimated 32,381 tCO₂e arising from the upfront material emissions of the pipework, transport of the pipework to site and the construction waste management. - Earthworks, including the excavation of material for the pipework - Construction of support buildings - Land use.	3.5 years (August 2028 – February 2032)	Construction emissions should be minimised through design optimisation and environmentally sensitive practices reflecting the Carbon Reduction Hierarchy. Prioritise use of more sustainable materials, products with reduced embodied emissions, and materials with higher proportion of recycled content.	Potential significant effects will be detailed within the ES. The emissions arising from the pipework alone contribute 0.09% of the regional carbon budget during the construction period. This is not considered to be significant.
		Operation	Release of emissions arising from operational energy and water during the 25-year lifespan, including monitoring equipment, heating, lighting and pumping. Release of emissions arising from the leakage of CO₂, maintenance, replacement, refurbishment and repair of the pipeline and associated infrastructure.	25 years	Operational emissions should be minimised by specifying long-lasting, high efficiency materials that require minimal maintenance and refurbishment, and using best practice in energy efficiency. Implementing a leak detection and maintenance programme will mitigate the release of unexpected emissions.	Potential significant effects will be detailed within the ES.
		Decommissioning	Release of emissions arising from decommissioning plant use, transportation of waste for disposal, and disposal of waste	To be determined	Maximising potential for reuse, recycling, and / or recovery of materials and elements at end-of-life through design, specification and dismantling practices. Prioritising local waste disposal facilities to minimise transportation distance.	Potential significant effects will be detailed within the ES, however as the pipe is to remain in-situ, the expected effect is not significant.

9.10 Next Steps

Design Development

- 9.10.1 As the design continues to progress, further design data regarding quantities of materials required for construction, their transport to site, construction energy and operational requirements will be used to inform the GHGs Assessment.

Engagement

- 9.10.2 Engagement with the local authorities listed in Table 9-3 will be undertaken throughout the assessment process.

Surveys

- 9.10.3 No surveys are required to complete the GHGs Assessment.

9.11 References

- Ref 9.1 United Nations, 2015. The Paris Agreement [online] United Nations Climate Change. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement>
- Ref 9.2 UK Government (2019). The Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: <https://www.legislation.gov.uk/ukdsi/2019/9780111187654>
- Ref 9.3 Department for Energy Security and Net Zero (2023) Overarching National Policy Statement for Energy (EN-1). Available at: <https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf>
- Ref 9.4 Department for Energy Security and Net Zero (2023) National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) <https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf>
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- Ref 9.6 Invest Humber (n.d.) Humber Vision 2030. Available at: <https://investhumber.com/documents/HED-Brochure.pdf>
- Ref 9.7 Yorkshire & Humber Climate Commission (2024). Yorkshire & Humber Climate Action Plan. University of Leeds on behalf of Yorkshire &

Humber Climate Commission. Available at:

https://yorksandhumberclimate.org.uk/wp-content/uploads/2024/10/30262_UoL_YHCC_ClimateActionPlan24_Accessible.pdf

- Ref 9.8 East Riding of Yorkshire Council (2022) East Riding Climate Change Strategy 2022-2030. Available at: <https://cape.mysociety.org/media/data/plans/east-riding-of-yorkshire-council-8bd6a5e.pdf>
- Ref 9.9 North Yorkshire Council (2023) North Yorkshire Council Climate Strategy 2023-2030 (2023). Available at: <https://cape.mysociety.org/media/data/plans/east-riding-of-yorkshire-council-8bd6a5e.pdf>
- Ref 9.10 North Lincolnshire Council (n.d.) A Green Future: Our Strategy. Available at: <https://www.northlincs.gov.uk/your-council/a-green-future/our-strategy/>
- Ref 9.11 North East Lincolnshire Council (2018) Local Plan 2013 to 2032 Available at: <https://www.nelincs.gov.uk/assets/uploads/2018/05/20180518-AdoptedLocalPlan2018-WEB.pdf>
- Ref 9.12 IEMA (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance. Available at: <https://www.iema.net/resources/blogs/2022/02/28/iema-launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions-february-2022/>
- Ref 9.13 BSI (2023) PAS 2080:2023, Carbon Management in buildings and infrastructure. Available at: https://www.bsigroup.com/siteassets/pdf/en/insights-and-media/insights/brochures/pas_2080.pdf
- Ref 9.14 Royal Institute of Chartered Surveyors (2023) Whole Life Carbon Assessment for the Built Environment. Available at: https://www.rics.org/content/dam/ricsglobal/documents/standards/Whole_life_carbon_assessment_PS_Sept23.pdf
- Ref 9.15 UK Government (2025). UK local authority and regional greenhouse gas emissions statistics: 2005-2023. Available at: <https://www.gov.uk/government/collections/uk-local-authority-and-regional-greenhouse-gas-emissions-statistics>
- Ref 9.16 UK Government (2021) Carbon budgets. Available at: <https://www.gov.uk/guidance/carbon-budgets>
- Ref 9.17 Tyndall Centre for Climate Change Research (2025) Setting Climate Commitments for Yorkshire and the Humber. Available at: <https://carbonbudget.manchester.ac.uk/reports/YH/>

- Ref 9.18 The Climate Change Committee (2025) The Seventh Carbon Budget. Available at: <https://www.theccc.org.uk/publication/the-seventh-carbon-budget/>

10 Ground Conditions and Hydrogeology

10.1 Introduction

- 10.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of ground conditions and hydrogeology. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Volume 2 - Chapter 2: Project Description.
- 10.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary geological and hydrogeological effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 10.1.3 This chapter should be read in conjunction with:
- Chapter 5: Agriculture and Soils – where the effects of agricultural soils are considered.
 - Chapter 7: Ecology and Biodiversity – where effects to benthic habitats are considered.
 - Chapter 8: Climate Resilience - due to the influence of climate change on ground conditions and hydrogeology.
 - Chapter 11: Cultural Heritage for interactions between Ground Conditions / Hydrology and waterlogged deposits with archaeological potential.
 - Chapter 17: Materials and Waste – where the effects on minerals are considered.
 - Chapter 18: Hydrology and Land Drainage – where the effects on hydrology and land drainage are considered.
 - Chapter 19: Major Accidents and Disasters – where the effects from major accidents and disasters are considered.
 - Chapter 20: Coastal Processes - where effects of coastal erosion and physical processes are considered.
- 10.1.4 This chapter is supported by the following figures:
- Figure 10.1: Superficial Geology.
 - Figure 10.2: Bedrock Geology.
 - Figure 10.3: Active and Historical Landfills.
 - Figure 10.4: Geological and Potential Contaminated Land Features.
 - This chapter is supported by the following appendices:

- Volume 4 - Appendix 7.3 Intertidal and Marine Technical Appendix – where preliminary results of the intertidal survey are discussed, alongside comparisons drawn with the previous 2022 survey.
- Volume 4 - Appendix 4.1 Draft Construction Environmental Management Plan.

10.2 Legislation, Policy and Guidance

Legislation

- 10.2.1 Legislation relevant to Ground Conditions and Hydrogeology is detailed in Table 10-1

Table 10-1 – Summary of Legislation relevant to Ground Conditions and Hydrogeology

Legislation	How it is considered within this PEIR
Wildlife and Countryside Act 1981 (as amended) (Ref 10.1) National Parks and Access to the Countryside Act 1949 (Ref 10.2)	Geological sites of national importance are principally afforded protection under this legislation by designating sites such as Sites of Special Scientific Interest (SSSIs) or National Nature Reserves (NNRs). Geological sites of national importance have been identified within the baseline of the PEIR and where potential impacts are identified, the receptor has been included within the assessment.
Environmental Protection Act, 1990 (Ref 10.3)	This Act defines, within England, the system for waste management and control of emissions into the environment. The Act was intended to strengthen pollution controls and support enforcement with heavier penalties. Before the Act there had been separate environmental regulation of air, water and land pollution and the Act brought in an integrated scheme that would seek the "best practicable environmental option". This legislation has been considered within the embedded mitigation measures outlined within this chapter.
The Water Resources Act 1991 (as amended) (Ref 10.4)	This Act concerns water resource management, water abstraction, and water pollution offences. This Act sets out the regulatory regime under which water abstraction and impounding is licensed by the Environment Agency. It is a criminal offence to knowingly permit any poisonous, noxious or polluting matter or any solid waste matter to enter any controlled waters. This legislation has been considered within the embedded mitigation measures outlined within this chapter.
The Land Drainage Act 1991 (as amended) (Ref 10.5)	This Act concerns drainage works and duties with respect to the environment with regards to land drainage. The act has been considered in the embedded mitigation of the PEIR, particularly relating to works near watercourses and works where there may be shallow groundwater levels.
Part 2A Environmental Protection Act 1990 – Section 57 Environmental Act 1995 (Ref 10.6)	This contains a regulatory regime for the identification and remediation of contaminated land. In addition to the requirements contained in the primary legislation, operation of the regime is subject to regulations and statutory guidance. This legislation has been considered within the baseline section of the PEIR where areas of potential sources of contamination have been identified.
The Water Framework Directive (2000/60/EC) (Ref 10.7)	The Water Framework Directive (WFD) establishes a framework for the protection of inland surface waters, transitional waters, coastal waters, and groundwater. In the PEIR baseline the WFD status of receptors has been described and in the additional mitigation and enhancement measures section, consideration has been given to avoid WFD non-compliance.
The Water Act 2003 (as amended 2014) (Ref 10.8)	This Act concerns the management of water resources including measures through licensing abstractions to address pressures on water resources and to ensure long term sustainability of water environments. Measures include the Environment Agency being able to time limit licences and to revoke or vary abstraction licences to protect the environment.
The Groundwater Directive (2006/118/EC) (Ref 10.9)	This supplements the Water Framework Directive. It sets out groundwater quality standards, criteria for assessing good chemical status, and requirements for monitoring and trend reversal of pollution. This has been considered in the baseline section of the PEIR where the status of waterbodies has been reviewed, and also in the additional mitigation and enhancement measures section in order to protect the status of waterbodies and groundwater dependent features.
The Priority Substances Directive (2008/105/EC) (Ref 10.10)	Provides Environmental Quality Standards for the concentrations of specific chemical in bodies of surface water. This legislation has been considered within the embedded mitigation measures outlined within this chapter.
Groundwater (England and Wales) Regulations, 2009 SI 2902 (Ref 10.11)	These regulations define hazardous and non-hazardous pollutions, outline permitting of discharges to groundwater and regulate inputs of pollutants to groundwater. The regulations require the prevention of entry of hazardous substances into groundwater and limitation of entry of non-hazardous pollutants into groundwater. The regulations aim to protect groundwater as a valuable resource for drinking water and the environment. This legislation has been considered within the baseline section of the PEIR where areas of potential sources of contamination have been identified.

Legislation	How it is considered within this PEIR
The Contaminated Land (England) (Amendments) Regulations, 2012 SI 1380 (Ref 10.12)	These regulations amended the 2006 version to take account of protected areas under Directive 2000/60/EC of the European Parliament and of the Council, establishing a framework for Community action in the field of water policy. They also take account of the updated definition of “controlled waters” in section 78A(9) of the Environmental Protection Act 1990. This legislation has been considered within the baseline section of the PEIR where areas of potential sources of contamination have been identified.
Environmental Damage (Prevention and Remediation) (England) Regulations, 2015 SI 810 (Ref 10.13)	These regulations define environmental damage and are concerned with the prevention of and remediation of environmental damage. The regulations have been considered in the baseline section of the PEIR with respect to the potential for significant adverse effects on the environment, specifically relating to groundwater. The regulations have been considered in the embedded mitigation section of the PEIR with respect to spills and leaks and action to prevent these and impacts from them.
The Environmental Permitting (England and Wales) Regulations 2016 SI 1154 (Ref 10.14)	These regulations provide the permitting regime that encompasses water discharge activities, groundwater activities, waste management activities and some activities associated with mines and quarries, including waste mining operations. An environmental permit is required for specified activities. Certain activities may benefit from an exemption from the environmental permitting regime, provided that they fulfil the conditions set by the EA. These regulations have been considered in the embedded mitigation section of the PEIR with respect to temporary dewatering and discharge.
The Water Environment (Water Framework Directive) Regulations 2017 SI 407 (Ref 10.15)	These regulations concern environmental objectives related to rivers and waterbodies. This legislation implemented the WFD in England and Wales. Under section 2 of the European Union (Withdrawal) Act 2018 (Ref 18.4), the 2017 Regulations continue to have effect in domestic law following the UK's withdrawal from the European Union. The WFD stages 1 and 2 are included in Volume 4 - Appendix 18.2: WFD 1&2.
Environment Act 2021 (Ref 10.16)	Part 5 of this Act brings together measures to strengthen and update the existing regulatory and long-term planning framework for water (including groundwater), helping to reduce environmental risks, including to water quality and land drainage. It also strengthens the regulation of water and sewerage undertakers by the newly established Office for Environmental Protection. This legislation has been considered within the embedded mitigation measures outlined within this chapter.

Policy

National Planning Policy

- 10.2.2 National Planning Policy relevant to Ground Conditions and Hydrogeology are detailed in Table 10-2

Table 10-2 – Summary of National Planning Policy relevant to Ground Conditions and Hydrogeology

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Overarching National Policy Statement for energy (EN-1) (Ref 10.17)		
Section 5.4.1 (part)	“Geological conservation relates to the sites that are designated for their geology and / or their geomorphological importance.”	The Ground Conditions and Hydrogeology assessment within the PEIR has considered the effects and resulting impacts associated with the construction / commissioning, operation and decommissioning phases on the Geological Sites of Special Scientific Interest and Regionally Important Sites. This is based on information currently known and as the Project design develops further mitigation measures may be required, which will be detailed within the ES chapter.
Section 5.4.35 (part)	“Applicants should include appropriate avoidance, mitigation, compensation and enhancement measures as an integral part of the proposed development.”	The Ground Conditions and Hydrogeology assessment will consider the potential need for avoidance, mitigation, and enhancement.
Section 5.11.17	“Applicants should ensure that a site is suitable for its proposed use, taking account of ground conditions and any risks arising from land instability and contamination.”	The Ground Conditions and Hydrogeology assessment within the PEIR has considered impacts from contamination, based on information known to date. Further assessment will be undertaken as the Project design develops, and this will be considered within the ES chapter. Land instability is not considered in the PEIR but will be considered in the engineering design elements of the Project.
Section 5.16.3	“Where the Project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment, as part of the ES or equivalent (see Section 4.3 and 4.10).”	The Ground Conditions and Hydrogeology assessment within the PEIR has considered the effects and resulting impacts on identified receptors associated with the construction / commissioning, operation and decommissioning of the Project. This is based on information currently known and as the Project design develops further mitigation measures may be required, which will be detailed within the ES chapter.
National Policy Statement for natural gas supply infrastructure and gas and oil pipelines (EN-4) (Ref 10.18)		
Section 2.23.40	“Where the Project is likely to have effects on water resources or water quality, for example impacts on groundwater recharge or on existing surface water or groundwater abstraction points, or on associated ecological receptors, the applicant should provide an assessment of the impacts in line with Section 5.16 of EN-1 as part of the ES.”	The Ground Conditions and Hydrogeology assessment within the PEIR has considered the effects and resulting impacts on identified receptors associated with the construction / commissioning, operation and decommissioning of the Project. This is based on information currently known and as the Project design develops further mitigation measures may be required, which will be detailed within the ES chapter.
Section 2.23.49	“ <i>When considering any application where the pipeline goes under a designated area of geological or geomorphological interest</i> , the applicant should submit details of alternative routes, which either bypass the designated area or reduce the length of pipeline through the designated area to the minimum possible, and the reasons why they were discounted.”	Where possible, the design of the HCCP route includes avoidance of designated areas of geological interest. Where this has not been possible, mitigation measures will be implemented to reduce the impact to the geological receptor.
National Planning Policy Framework (NPPF) (Ref 10.19)		

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Paragraph 124	‘Planning policies and decisions should promote an effective use of land in meeting the need use, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously developed or ‘brownfield’ land’	Routeing of the Project has taken into consideration the former land uses and current land uses within the route. The Project has been designed to be routed, where possible, to utilise brownfield land, or if this is not achievable, land of lower strategic importance.
Paragraph 125	Planning policies and decisions should give substantial weight to the value of using suitable brownfield land for developments. Proposals for which should be approved unless substantial harm would be caused, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land.	Routeing of the Project has taken into consideration the former land uses and current land uses within the route. the Project has been designed to be routed, where possible, to utilise brownfield land, or if this is not achievable, land of lower strategic importance.
Paragraph 187	Planning policies and decisions should contribute to and enhance the natural and local environment by: - Protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan). - Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans. - Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate	The Ground Conditions and Hydrogeology assessment within this PEIR has considered the effects and resulting impacts on identified receptors associated with the construction / commissioning, operation and decommissioning of the Project. This is based on information currently known and as the Project design develops further mitigation measures may be required, which will be detailed within the ES chapter. Where possible the design of the HCCP project has avoided nationally and locally geologically important sites, and sites of potential contaminative sources, thus protecting these sites from potential impact. Where the design of the route was not able to avoid these geologically sensitive areas, or potential sources of contamination, mitigation measures (such as ground investigation and remediation, site specific construction practices) will aim to reduce and mitigate against the potential impacts.
Paragraph 196	Planning policies and decision 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, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation). - After remediation, as a minimum, land should be capable of not being determined as contaminated land under Part IIA of the Environmental Protection Act 1990. - Adequate site investigation information, prepared by a competent person, is available to inform these assessments.	The Ground Conditions and Hydrogeology assessment within this PEIR has considered the effects and resulting impacts on identified receptors associated with the construction / commissioning, operation and decommissioning of the Project. This is based on information currently known and as the Project design develops further mitigation measures may be required, which will be detailed within the ES chapter. Where possible the design of the HCCP project has avoided nationally and locally geologically important sites, and sites of potential contaminative sources, thus protecting these sites from potential impact. However, if interaction is unavoidable, it is proposed within the embedded mitigation measures that if potentially contaminated land is identified within the Project, then a suitably designed ground investigation is undertaken to inform a risk assessment to determine if remedial measures are required.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
		Where interaction with geologically sensitive areas is unavoidable, appropriate mitigation such as the appropriate construction methodology for the site, will be adopted to minimise the risks to these sensitive areas. The impacts of mining on the Project have been considered within this chapter.
Paragraph 197	Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.'	It is proposed within the embedded mitigation measures that if potentially contaminated land is identified within the routeing of the Project, then a suitably designed ground investigation is undertaken to inform a risk assessment to determine if remedial measures are required.

Local Planning Policy

- 10.2.3 Local Planning Policies relevant to Ground Conditions and Hydrogeology are detailed in Table 10-3.

Table 10-3 – Summary of Local Planning Policy relevant to Ground Conditions and Hydrogeology

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby Local Plan (2022) (Ref 10.20)	Policy NE8	“Development which could present noise pollution, light pollution, groundwater pollution, contamination of land or water and other environmental pollution or unstable land will not be permitted unless satisfactory remedial or preventative measures are incorporated. This will be considered an integral element of the scheme. Measures should be carried out before the use of the site commences and sufficient consideration provided to both human and environmental receptors of any potential impact. Planning applications must be accompanied by the appropriate assessments in line with the Council's Validation Checklist”	The Ground Conditions and Hydrogeology assessment within this PEIR has considered impacts associated with the Project based on the available information. Measures to mitigate impacts have been proposed, where appropriate. As the design develops, further mitigation measures will be proposed within the ES to reduce the overall Ground Conditions and Hydrogeology impacts of the Project on identified receptors.
East Riding of Yorkshire Local Plan (2025) (Ref 10.21)	Policy ENV5	Enhance sites designated for nature conservation and other wildlife-rich places - newly created and restored wildlife-rich habitats, corridors and stepping stones will help wildlife populations to grow and move; Improve the landscape's resilience to climate change, providing natural solutions to reduce carbon and manage flood risk, and sustaining vital ecosystems by improving soil, water and air quality; Reinforce the natural and cultural diversity of our landscapes, and protect our historic natural environment; and Enable us to enjoy and connect with nature where we live, work and play - benefiting our health and wellbeing.	
East Riding of Yorkshire Local Plan (2025) (Ref 10.21)	Policy ENV6	“Environmental hazards, such as flood risk, coastal change, groundwater pollution and other forms of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment. Policy ENV6 applies to all types of environmental hazard, which incorporates both existing hazards and / or any hazard that may be caused or exacerbated as a result of new development. This includes flood risk, coastal change, contaminated land, unstable land, hazardous installations, water pollution, and pollution generated by light, noise, dust, smell, vibration, fumes, smoke, soot, ash or grit. Many hazards are controlled through relevant statutory controls and procedures, and consultation with relevant bodies, such as the Health and Safety Executive (HSE) or the Environment Agency. Where a proposal is likely to generate or be affected by an environmental hazard, for example it is located close to a wastewater treatment works where odour could occur, early discussions should take place with the relevant bodies / departments as early as possible in the development process, preferably at pre-application stage.”	The Ground Conditions and Hydrogeology assessment within this PEIR has considered impacts associated with the Project based on the available information. Measures to mitigate impacts have been proposed, where appropriate. As the design develops, further mitigation measures will be proposed within the ES to reduce the overall Ground Conditions and Hydrogeology impacts of the Project on identified receptors.
North Lincolnshire Council Local Plan (2024) (Ref 10.22)	Section DS7	“In the case of proposals for development on land known or strongly suspected as being contaminated, applicants will be required to demonstrate that the level of contamination can be overcome by remedial measures or improvements. Permission will only be granted on contaminated sites where a detailed site survey has been submitted, and a suitable	

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		scheme of remedial measures has been agreed to overcome any existing contamination. Conditions will be imposed and / or a planning obligation entered into to secure the implementation of such a scheme at the appropriate time in the development process and to otherwise restrict and control the development.”	
North East Lincolnshire Local Plan 2013 to 2032 (Ref 10.23)	Policy 41 Policy 44	The Council will have regard to geodiversity when considering development proposals, seeking specifically to: B. designate Local Geological Sites (LGSs) in recognition of geological value. C. protect manage and enhance international, national and local sites of geological conservation importance, and the need for appropriate buffer zones; 2. Any development which would, either individually or cumulatively, result in significant harm to geodiversity which cannot be avoided, adequately mitigated or as a last resort compensated for, will be refused. The Council will safeguard mineral deposits of sand and gravel, and blown sand (silica sand) within the identified Minerals Safeguarding Areas, unless the development outweighs the need to safeguard the site for future mineral extraction	The Ground Conditions and Hydrogeology assessment within this PEIR has considered impacts associated with the Project based on the available information. Measures to mitigate impacts have been proposed, where appropriate. As the design develops, further mitigation measures will be proposed within the ES to reduce the overall Ground Conditions and Hydrogeology impacts of the Project on identified receptors.

Guidance

10.2.4 The Ground Conditions and Hydrogeology assessment has been carried out in accordance with the following guidance:

- Environment Agency (2025) Land Contamination Risk Management (LCRM) (Ref 10.24). Land Contamination Risk Management involves assessing, identifying, and managing potential risks associated with contaminated land to protect human health and the environment.
- Environment Agency's (2018) approach to groundwater protection (Ref 10.25). This guidance sets out the principles of groundwater protection.
- Contaminated Land Risk Assessment (CIRIA) 552, A guide to good practice, CIRIA 2001 (Ref 10.26). CIRIA sets out guidance for the approach to contaminated land risk assessment.
- BS 10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of Practice, British Standards Institution 2017 (Ref 10.27). This code of practice provides recommendations and guidance for investigation on site which could potentially be affected by contamination.
- BS 5930:2015+A1:2020 Code of Practice for ground investigations, British Standards Institute, 2020 (Ref 10.28). This document provides guidance on the legal, environmental, and technical matters relating to site investigation.
- Design Manual for Roads and Bridges (DMRB) LA 109: Geology and soils, Highways England, 2019 (Ref 10.29). DMRB LA109 provides a framework for assessing and managing the effects associated with geology and soils.
- Design Manual for Roads and Bridges (DMRB) LA113: Road Drainage and the Water Environment (Ref 10.30). DMRB LA113 provides a framework for assessing and managing the effects associated with road drainage and the water environment.
- Protect groundwater and prevent groundwater pollution. Environment Agency 2024 (Ref 10.31). This guidance sets out the control and permitting of activities that could affect the quantity or quality of groundwater.
- Regulatory Position Statement 261: Environment Agency 2018 (Ref 10.32). This guidance sets out the regulatory approach for consenting the discharge of clean rainwater from excavations.
- Regulatory Position Statement LIT 16814, Environment Agency 2019 (Ref 10.33). This guidance sets out the position status of low-risk passive dewatering.
- National Planning Policy Framework Guidance: Land Affected by Contamination, Ministry of Housing, Communities and Local Government

2025 (Ref 10.34). This guidance provides guiding principles on how planning can deal with land affected by contamination.

- The Definition of Waste: Code of Practice, CL:AIRE, 2011 (Ref 10.35). Guidance on the classification of waste materials from construction for re-use and disposal.

10.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 10.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined below in Table 10-4

Table 10-4 – Summary of Scoping Opinion relevant to Ground Conditions and Hydrogeology

Section Reference	Matter	Comments from PINS	Applicant Response
Environment Agency Response Appendix 1	Legislation and Guidance	Guidance used to assess ground conditions and hydrogeology is listed as 9.2.6. This list appears to be very limited. We strongly recommend that, as a minimum, the applicant also refers to the following: Environment Agency land contamination guidance: Land contamination risk management (LCRM) and materials referred to therein The Environment Agency's approach to groundwater protection: Groundwater protection position statements	The aforementioned guidance has been considered within this report and has been added to section 10.2.4.
Environment Agency Response Appendix 1	Hydrogeology	Our records indicate several potable and other groundwater abstraction licences within the Study Area for the hydrogeological conditions assessment. The applicant states that they will contact local authorities (Section 9.8.2) and the Environment Agency (9.8.14) in relation to this data. Some data might also need to be obtained from water companies.	Local Authorities and the Environment Agency have been contacted for information, and water companies will be contacted with information to be included in the ES. We confirm that potable water groundwater abstractions are shown within the Study Area, based on published merged source protection zone mapping.
Environment Agency Response Appendix 1	Groundwater Source Protection Zone – pilling risk assessment	Relevant sections of this report, such as 7.10.2, recognise that piling can pose a risk to groundwater, and that a piling risk assessment may be required to ensure any risks are adequately mitigated.	Areas where groundwater is at risk from piling will have a piling risk assessment/ foundation risk assessment undertaken to make sure appropriate mitigation is in place.
Environment Agency Response Appendix 1	Contents of Appendix F	Appendix F should not be restricted to being a Surface Water Management Plan. Instead, we suggest a Controlled Water Management Plan, to include groundwater, and the implications of dewatering requirements in terms of abstraction licensing, discharge management and permitting.	A Groundwater Management Plan will be produced as part of an overarching Controlled Water Management Plan. This will include implications of dewatering requirements in terms of abstraction licensing, discharge management and permitting. Together with the Surface Water Management Plan, protection of controlled waters will be addressed. Joint planning of the documents will allow coordination of measures beneficial for groundwater supported surface water features and habitats. See further information in the Next Steps section of the chapter.
Environment Agency Response Appendix 1	Assessment	Historical landfills are discussed briefly in 9.8.20. Our records show several active and historical landfills either within the draft Order Limits or within the 250m search buffer specified in 9.6.1. No comment is made about these in the report. No information is given about the historical landfills.	A review of historical and active landfills within 250m of the draft Order Limits has been completed. The review assessed the landfills' location, their status and an overview of the wastes they accepted. For any landfills that have direct interaction with the scheme these are discussed further in the Current Potentially Contaminative Land Uses (section 10.5) for each respective section of the route.

Section Reference	Matter	Comments from PINS	Applicant Response
Environment Agency Response Appendix 1	Supporting documents to be produced	We have noted no mention of the following, which we might expect for a project of this type, especially given geological conditions: Operations Environmental Management Plan (or equivalent) Foundation Works Risk Assessment, especially for where the route passes through SPZs	An Operations Environmental Management Plan and foundations work risk assessment will form part of the mitigation and will be taken into consideration when discussing areas within the SPZs,
Environment Agency Response Appendix 1	Site Setting	The potential for potential for artesian groundwater conditions is mentioned in Table 17-4 but nowhere else in the report (Scoping Report). Artesian conditions are possible and must be considered. In Section 9.7.1, aquifers are given as hydrogeology receptors. We consider SPZs and groundwater abstractions (private and public) should also be given here as specific receptors. The WFD groundwater bodies identified in 9.8.11, Table 9-6 do not match our records. This should be corrected for all future documents.	Artesian conditions information is noted in the PEIR and will be used to inform the ES. SPZs and groundwater abstractions (private and public) are shown as specific receptors in this PEIR, and further assessment of these sensitive receptors will be made in the ES. WFD groundwater bodies have been updated in this document.
Environment Agency Response Appendix 1	Scoping	Sensitive receptors are identified in 9.7.1. This list should include groundwater and surface water abstractions (private and public supply)	Groundwater abstractions (public and private) are included as receptors in this PEIR chapter and will be so in the ES. Where surface water abstraction relies upon a watercourse that is supported by groundwater then this will also be assessed in the ES. Further information about surface water abstractions is shown in Chapter 18: Hydrology and Land Drainage.
Environment Agency Response Appendix 1	Safeguard Zones	There seems to be a misunderstanding of the purpose of Safeguard Zones (not “Safeguarding” as written) (Section 9.8.10). These are designated at a catchment scale, but do not require actions or impacts to be at a catchment scale. They are designated where there are already known impacts to public water supply abstractions, and so highlight where risks exist, and mitigation is needed. Further information is available on GOV.UK: Safeguard zones (SgZs) are used for areas around abstractions where water quality is poor. An SgZ means that there will be strict enforcement of existing measures for particular pollutants and activities, and possibly new voluntary measures. SgZs are not statutory designated areas but are where additional measures are needed to improve water quality.	The correct use of terminology of Safeguard Zones is used in the PEIR and will be used in the ES. Safeguard Zones have not been assessed as part of the PEIR. Future consultation with the EA and water companies will include discussion about mitigation measures needed to protect public water supply abstractions. This will be an opportunity to explore whether specific measures in relation to Safeguard Zones are required.
ID 3.14.5	To be scoped out of the Major Accidents and Disaster chapter and included in Ground Conditions: Impacts on mines and storage caverns -	The assessment of mines and storage caverns is included in Chapter 10: Ground Conditions and Hydrogeology.	It is noted that The Coal Authority response to the Scoping Report stated the following ‘Our records do not indicate the presence of any coal mining features at surface or shallow depth, which may pose a risk to surface stability and public safety, along the route identified. The site is however in the defined Development Low Risk Area, where coal mining

Section Reference	Matter	Comments from PINS	Applicant Response
	construction and operational phases		features may be present but at depths that do not impact on surface stability.' On the basis of the above, the potential risk posed by coal mining legacy does not need to be considered as part of the EIA. The presence of mines and storage caverns will be included in the baseline section of the ES chapter, however based on the above response it is likely that this impact will be scoped out of the ES chapter.
Canal and Rivers Trust	Assessment	We believe that the Environmental Assessment should capture the crossings of the Aire & Calder and River Ouse as receptors and consider the present and future baselines. It would be helpful if the Statement considers whether there will be any change to the future baseline for the Aire & Calder Navigation and River Ouse crossing sites.	The Aire and Calder and River Ouse will be considered as separate receptors, including changes to their baseline and future baseline, as part of the ES. Also, suitable cross-reference relating to the interaction of groundwater and surface water, will be made with the ES chapter for Hydrology and Land Drainage.
Environment Agency Response Appendix 1	Assessment	Section 5.10.7, it states: "During operation, soil temperatures around the pipeline may be increased as a result of higher fluid temperatures within the pipeline." Heat is defined as a pollutant under the Environmental Permitting Regulations 2016 (as amended) and is subject to regulatory controls. If fluid temperatures within the pipeline can affect soil, we consider that they can also affect groundwater. Recommendation: please scope this into the assessment.	Groundwater will be considered as being potentially affected by increased temperatures in the pipeline. This will be reported in the ES following further design work and surveys.
Environment Agency Response Appendix 1	Assessment	Historical landfills are discussed briefly in 9.8.20. Our records show several active and historical landfills either within the draft Order Limits or within the 250m search buffer specified in 9.6.1. No comment is made about these in the report. No information is given about the historical landfills. Recommendation: we strongly recommend that the applicant revisits this search. A commercially available environmental database search may be beneficial.	We have expanded on the information provided for the landfills which interact and are directly adjacent with the Study Area. An assessment of landfill locations, their status and an overview of the wastes they accepted has been undertaken. For any landfills that have direct interaction with the scheme these are discussed further in the Current Potentially Contaminative Land Uses (Section 10.5) for each respective section of the route

Summary of Engagement

- 10.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 10-5 below.

Table 10-5 – Summary of Stakeholder Engagement relevant to Ground Conditions and Hydrogeology

Consultee	Date and method of engagement	Summary of Issues Raised	Response
FCC Environmental- Winterton Landfill	September 2024- Email Correspondence Teams Meeting	Questions regarding the operations undertaken at the Winterton Landfill Site (within Section 2 of the route), and what areas were active within the landfill boundary. Plans of the landfill cells have been provided by FCC and are to be included within the ES.	FCC environmental confirmed that only the southern section of the landfill is currently active and the northern half of the landfill (where interaction with the Study Area occurs) has been infilled, capped and restored and utilised for other means now.
North Yorkshire Council (NYC)	An environmental data request was issued to NYC.	The local authority provided a summary of their records of Potentially Contaminated Sites and Landfills situated within their jurisdiction, which fall within the Study Area	This information has been used within the baseline section of the PEIR.
East Riding of Yorkshire Council	An environmental data request was issued to NLC.	The local authority provided records of historic landfilling activities within the Study Area (Land drains, ponds, landfills etc.).	This information has been used within the baseline section of the PEIR.

10.4 Assessment Methodology

Baseline Data

10.4.1 Baseline conditions of the Project were established using the following sources:

- Google Earth Pro- Satellite imagery and mapping (Ref 10.36).
- Department for Environment Food and Rural Affairs (Defra), Magic Maps (Ref 10.37).
- British Geological Survey (BGS) Online Viewer (Geo-Index) (Ref 10.38).
- Zetica UXO Risk Maps (Ref 10.39).
- Environment Agency (EA) Historical Landfill Sites (Ref 10.40).
- East Riding of Yorkshire Council Possible Landfills Records (Ref 10.41).
- The Mining Remediation Authority Interactive Map Viewer (Ref 10.42).
- UK radon (UK Health Security Agency) (Ref 10.43).
- North Yorkshire Council, Landfill Records (Ref 10.44)
- Ordnance Survey mapping (various scales / dates) available on the National Library of Scotland online mapping (Ref 10.45)

Study Area

10.4.2 The Study Area for Ground Conditions comprises the land within the draft Order Limits plus a 250m buffer. This buffer is considered sufficient to include all relevant potential contamination sources and receptors. Interaction between the Project and receptors, or sources of contamination beyond 250m generally would not occur as a result of the ground conditions present in and around the Project.

10.4.3 The Study Area for Hydrogeology comprises the land within the draft Order Limits plus a 500 m buffer. The distance of 500 m from the draft Order Limits is considered a worst-case distance for impacts on the groundwater environment, based on the limited depth of the HCCP and professional judgement.

10.4.4 In relation to the intertidal zone down to the Mean Low Water Springs (MLWS) at the landfall north of Easington, a 500 m buffer is proposed. An additional wider Study Area may also be considered. Specifically, a 15 km buffer offshore and along the shoreline, for the consideration of the dynamic environment. The 15 km buffer was informed by indicative tidal excursion ellipses from Atlas of Marine Renewable Energy Resources (Ref 10.46), which informed the typical extent of sediment transport within a tidal cycle in this coastal area. No intertidal interaction is anticipated at the Humber and tidal River Trent crossings; hence

emphasis has been placed at the Easington Landfall where there is greater potential for impact pathways.

Baseline Data Collection

Data Requests

- 10.4.5 A summary of the organisations that have supplied data upon request, together with the nature of that data is outlined in Table 10-6.

Table 10-6 – Summary of Data Sources

Organisation	Data Source	Data Provided
Environment Agency	-	Data has been requested and is awaited at the time of writing, to be reported in the ES.
North Yorkshire Council (Ref 10.44)	GIS	Recorded potentially contaminated sites and landfills. Locations of private water supplies in the Selby district (received 23 May 2025)
East Riding of Yorkshire Council (Ref 10.41)	GIS	Records of historical landfills / infilling activities. Groundwater information is awaited at the time of writing, to be reported in the ES.
North Lincolnshire Council	-	Data has been requested and is awaited at the time of writing, to be reported in the ES.
North East Lincolnshire Council	-	Data has been requested and is awaited at the time of writing, to be reported in the ES.

Site Visits and Surveys

Ground Conditions / Contaminated Land Walkover

- 10.4.6 An initial walkover was undertaken between the 17th-21st of March 2025. This involved a drive-by of areas of potential interest, and where access permitted conducting a walkover of these areas.
- 10.4.7 The drive-by was conducted along roads within and around the draft Order Limits, with the team stopping along the route, making observations and taking

photographs of the general surrounding areas, as well as specific sites of interest identified during the desk study.

- 10.4.8 During the walkover, photos and notes were taken and geotagged using QField.

Intertidal Phase 1 and Phase 2 Surveys

- 10.4.9 An intertidal Phase 1 walkover and Phase 2 sampling survey was undertaken at Easington Landfall in April 2025. Preliminary findings are presented within this chapter, where relevant. More detailed findings are presented in Appendix 7.3. Intertidal and Marine Technical Appendix. Final results of the survey will be presented at ES.
- 10.4.10 A survey was also undertaken in 2022. Results of this survey are presented throughout the PEIR, as relevant. Comparisons between the two years will be drawn in the ES.
- 10.4.11 The intertidal survey was undertaken at the Easington Landfall due to the potential for impact pathways from the project. Based on the assumed installation techniques proposed for the project, no interactions with the intertidal environment at the Humber and tidal River Trent crossings are anticipated, as a result specific surveys of these intertidal areas have not been undertaken.

Impact Assessment Methodology

- 10.4.12 The generic project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology. However, whilst this has informed the approach that has been used in this Ground Conditions and Hydrogeology assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this ground conditions and hydrogeology assessment. Details are provided below.
- 10.4.13 This assessment methodology comprises the collection of available baseline information to gather data to characterise the underlying ground conditions across the Project. The approach is consistent with the methodology drawn from DMRB LA 109: Geology and Soils (Ref 10.27), Environment Agency LCRM (Ref 10.20) and CIRIA C552 (Ref 10.24).

Sensitivity

- 10.4.14 The sensitivity of the identified receptors is defined as follows in Table 10-7, in general accordance with DMRB LA109 (Ref 10.29) and DMRB LA113 (Ref 10.30).

Table 10-7 – Receptor Sensitivity (as per DMRB LA109 and DMRB LA113)

Sensitivity / Value	Description / Criteria
Very High	Ground Conditions / Geology: • Very rare and of international importance with no potential for replacement e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSIs and Geological Conservation Review (GCR) where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such. Contamination: • Human Health: Very high sensitivity land use such as residential or allotments. • Surface Water: Watercourse having a WFD classification shown in a River Basin Management Plan (RBMP) and Q95 $\geq$ 1.0m³/s. • Site protected / designated under European Commission (EC) or UK legislation (Special Areas of Conservation (SAC), Special Protection Areas (SPA), SSSI, Ramsar site). Species protected by EC legislation. Hydrogeology: • Principal Aquifer providing a regionally important resource and / or supporting a site protected under EC and UK legislation. • Groundwater that locally supports Groundwater Dependent Terrestrial Ecosystems (GWDTE). • Groundwater Source Protection Zone (SPZ) 1 for public water supply.
High	Ground Conditions / Geology: ○ Rare and of national importance with little potential for replacement (e.g. geological SSSI, National Nature Reserves). Geology meeting national designation citation criteria which is not designated as such. Contamination: • Human health: high sensitivity land use such as public open space and construction workers. • Surface water: watercourse having a WFD classification shown in an RBMP and Q95 < 1.0m³/s. • Species protected under EC or UK legislation LA 108. Hydrogeology: • Principal aquifer providing locally important resource or supporting a river ecosystem. • Groundwater supports a GWDTE. Spring flow supporting a Chalk River. • Published SPZ2. Default SPZ1 for a private water supply (groundwater abstraction or spring).
Medium	Ground Conditions / Geology: • Of regional importance with limited potential for replacement (e.g. Regionally Important Geological Site). Geology meeting regional designation citation criteria which is not designated as such.

Sensitivity / Value	Description / Criteria
	Contamination: - Human health: medium sensitivity land use such as commercial or industrial - Surface water: watercourses not having a WFD classification shown in an RBMP and Q95 > 0.001m³/s Hydrogeology: - Aquifer providing water for agricultural or industrial use with limited connection to surface water. Secondary A aquifer. - SPZ3
Low	Ground Conditions / Geology: - Of local importance / interest with potential for replacement (e.g. non-designated geological exposures, former quarries / mining sites). Contamination: - Human health: low sensitivity land use such as highways and rail - Surface water: watercourses not having a WFD classification shown in an RBMP and Q9 5 ≤ 0.001m³/s Hydrogeology: - Secondary B aquifer. Secondary undifferentiated aquifer
Negligible	Ground Conditions / Geology - No geological exposures, little / no local interest. Contamination: - Human health: undeveloped surplus land / no sensitive land use proposed Hydrogeology: - Unproductive strata

Magnitude of Effect

- 10.4.15 The magnitude of impact will be rated based on the following, presented in Table 10-8:

Table 10-8 – Magnitude of Effect

Magnitude of Impact	Description
	Ground Conditions / Geology: • Loss of geological feature / designation and / or quality and integrity, severe damage to key characteristics, features or elements. Contamination: • Human health: ○ Significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. C4SLs) SP1010 (Ref 10.47) with potential for significant harm to human health. Contamination heavily restricts future use of land. • 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. • Loss of, or extensive change to, GWDTE or baseflow contribution to protected surface water bodies. • Reduction in water body WFD classification. • Loss of, or significant damage to, major structures through subsidence or similar effects.
	Ground Conditions / Geology: • Partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of / damage to key characteristics, features or elements. Contamination: • Human health: ○ Contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria (e.g. C4SLs) (Ref 10.47). ○ Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use. • 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

Magnitude of Impact	Description
	• 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
	Ground Conditions / Geology: • Minor measurable change in geological feature/designation attributes, quality or vulnerability; minor loss of, or alteration to, one or more key characteristics, features or elements. Contamination: • Human health: ◦ Contaminant concentrations are below relevant screening criteria (e.g. C4SLs) (Ref 10.47). Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health. • Surface water: ◦ Potential for a low risk of pollution. ◦ Minor effects on water supplies / abstractions Groundwater: • Potential low risk of pollution. • Minor effects on an aquifer, GWDTEs, abstractions and structures.
	Ground Conditions / Geology: • Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity of resource not affected. Contamination: • Human health: contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g. C4SLs) (Ref 10.47). No requirement for control measures to reduce risks to human health / make land suitable for intended use. • Surface water and groundwater - No measurable change. • No measurable impact upon an aquifer and / or groundwater receptors
	Ground Conditions / Geology: • No temporary or permanent loss / disturbance of characteristics features or elements. Contamination: • Human health: reported contaminant concentrations below background levels. • Surface water: no loss or alteration of characteristics, features or elements; no observable impact in either direction. • Groundwater: no loss or alteration of characteristics, features or elements; no observable impact in either direction. • No presence of groundwater.

Significance

- 10.4.16 The significance of an effect is assessed using professional judgement considering the sensitivity (or value) of the receptor within the Study Area, and the magnitude of change (impact) likely to be caused by the activities of the Project. These factors are combined to give an overall significance of effect.
- 10.4.17 The significance has been derived using the matrix set as set out below.

Table 10-9 – Significance Matrix

Environmental Value / Sensitivity	Magnitude of impact				
	No change	Negligible	Minor	Moderate	Major
Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Medium	Neutral	Neutral or slight	Slight	Slight or moderate	Moderate of large
Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

- 10.4.18 There is no equivalent published assessment methodology for the effects relating to geology (for example geological sites). For consistency, a source – pathway – receptor approach would be adopted to assess these effects (combination of receptor identification and associated sensitivity and magnitude of potential impacts) as stated above and in accordance with DMRB guidance (Ref 10.29 and 10.30).
- 10.4.19 Where the outcome of the significance assessment is moderate or major, then the effect is considered significant, and mitigation is required. Where the outcome is minor or negligible, then the effect is considered not significant, and mitigation is unlikely to be required.
- 10.4.20 The main impacts to surface water (hydrology) will be assessed as part of Chapter 18: Hydrology and Land Drainage. Within this chapter, the

assessment will consider water receptors in relation to existing historic contamination and whether pollutant linkages currently exist.

Assumptions and Limitations

- 10.4.21 The information provided in this PEIR is preliminary, the final assessment of likely significant effects will be reported in the ES.
- 10.4.22 An environmental database report has not been utilised in the PEIR. A review of historical mapping will be undertaken, and the results presented within the ES to establish if there are other areas of potential contaminative concern that should be investigated further.
- 10.4.23 The HCCP EIA Scoping Report (Ref 10.48) identified aspects of the Project that were scoped out of the EIA process. Aspects that have been scoped out are not addressed in this PEIR.
- 10.4.24 For ground conditions, the site walkover targeted areas of potential interest such as former and active landfills, and current industrial land users etc. The site walkover also included a drive-by of main access roads to provide a general coverage of the Project. Walkover surveys are limited by their nature and ground investigations to establish geotechnical and geo-environmental ground conditions are likely to be required prior to final design and construction.
- 10.4.25 The following locations were excluded from the ground conditions site walkover due to limited access:
- Keyingham Sewage Works.
 - Ings Lane Farm.
 - Horkstow.
 - The scrapyard west of Patrington.
- 10.4.26 Hydrogeology walkovers have not been conducted in advance of the preparation of the PEIR. These will be completed for the ES.
- 10.4.27 Historical groundwater features taken from the Scottish Library (Ref 10.45) were digitised onto a map using Arc GIS. This method can cause a small degree of offset when placing onto the basemap. Should a specific feature be subject to detailed assessment, the precise location will be checked against original historical basemaps and compared with current basemaps.
- 10.4.28 It is assumed that prior to the detailed design of the development, a Ground Investigation (GI) will be undertaken to assess ground conditions and the

potential presence of localised contamination. The GI will inform a risk assessment which will determine the impacts contamination (if present) may have on the relevant receptors.

- 10.4.29 The findings will feed into the detailed design process and Construction Environmental Management Plan (CEMP) for The Project so that appropriate measures and mitigation (if required) are taken.
- 10.4.30 If, during development, any contamination is found which has not been previously identified, an appropriate risk assessment will be prepared. Actions resulting from the findings of the risk assessment will be agreed with the local planning authorities along with any remedial measures in consultation with the EA if required.
- 10.4.31 In relation to the intertidal baseline, the data presented is limited to the best available data at the time of writing. In addition, only preliminary survey results have informed the baseline context. These preliminary results will subsequently be built on further with finalised results presented in the ES.

10.5 Baseline Conditions

Existing Baseline

- 10.5.1 The baseline provides a characterisation of the Study Area in terms of the geological and hydrogeological setting. For reporting purposes, the Project has been divided into three geographic sections numbered Section 1 to Section 3, as illustrated in Volume 3 - Figure 2.1: Key Features of the Project and as described in Chapter 2: Project Description. The three sections are as below:
- **Section 1** - From Drax in the west to the River Trent (North Yorkshire, crossing into the East Riding of Yorkshire and then entering North Lincolnshire).
 - Section 2 - From the River Trent to the north bank of the Humber (inclusive of the estuary) (mostly North Lincolnshire, with a small area of the draft Order Limits which extend into Northeast Lincolnshire).
 - Section 3 - From the north bank of the Humber to MLWS on the coast north of Easington (all within the East Riding of Yorkshire).
- 10.5.2 The above sections of the route are discussed further below:

Section 1 – Drax to the River Trent

Historical Context

- 10.5.3 The available historical maps (Ref 10.36, 10.45) show the site has remained largely undeveloped agricultural farmland since the earliest available map C.1830, with the villages of Drax, Rawcliffe and Keadby present in their current locations. The Lancashire and Yorkshire Railway is also present south of Rawcliffe. The Trent, Ancholme and Grimsby Line railway is mapped south of Keadby in the 1900 mapping. Construction of Drax Power Station was completed in 1974. Keadby coal fired power station was constructed in 1940-1950s and has since been replaced by Keadby Gas power station and Keadby 2 (constructed in 1990s and 2018-2023 respectively). Key features are shown in Figure 10.4.

Site Setting – Walkover Summary

- 10.5.4 Section 1 extends between Drax in the northwest, to the River Trent in the east, with a single spur south to Keadby.
- 10.5.5 The site is predominantly flat agricultural fields separated by field drains and hedgerows. From the northeast, the site starts close to Drax Power Station, a large biomass power plant. The Drax AGI is located in a gently sloping agricultural field, bounded by a sparse woodland to the west, and drains to the north and south.
- 10.5.6 Continuing south from Drax, the route passes through flat agricultural fields, with occasional farmhouses. A farm on Ings Lane, near where the route crosses the river Aire, was surveyed and a number of barrels, Intermediate Bulk Containers (IBCs), scrap metal, concrete, potential asbestos cement corrugated boards, and other farm refuse was identified.
- 10.5.7 South from the River Aire, the route partially crosses Rawcliffe historical landfill, which is currently a wooded area northwest of the A461. The site walkover of the historical landfill noted a slight rise in ground level along the eastern margin of the landfill; however this may have been due to excavation to construct the nearby flood defences. Glass and ceramic fragments were rarely seen and may have been indicative of fly tipping rather than landfilling. The trees observed on site were generally small, and likely relatively young.
- 10.5.8 South of the Rawcliffe historical landfill, the route crosses the M62 motorway, before bending to the east, where it crosses the Dutch River canal, and then M18 motorway. Continuing east the route goes through flat agricultural fields,

separated by field drains, until the Eastoft AGI, where a spur extends southwards, and the main pipeline continues east.

- 10.5.9 The southern spur extends approximately 9.5 km through flat agricultural fields. The Keadby AGI is located in a flat agricultural field north of Keadby Power Station. A series of electrical pylons cross the field to the east of the AGI, and two wind turbines are located within the field.
- 10.5.10 Continuing east from the Eastoft AGI, the route crosses more flat agricultural fields separated by field drains until the River Trent, which marks the eastern boundary of Section 1.

Site Setting – Geology

- 10.5.11 Figure 10-1: Superficial Geology and Figure 10-2: Bedrock Geology present the published geology mapping of the superficial deposits and bedrock geology along the Project route. Published geological maps and the GIS data has been sourced from the BGS (Ref. 10.38).
- 10.5.12 The following geologies have been identified within Section 1; however, they may not be present across the full extent of the section. The geological units encountered within Section 1 (ordered by age) are summarised in Table 10-10 below.

Table 10-10 – Section 1 Geological Succession

Section 1 Geology	Description
Superficial Geology	
Warp	Artificially induced Alluvium- Geologically identical to Alluvium (detailed below), however is found as a result of human activities such as river flooding and other flood management schemes. The material is naturally deposited but as a result of human intervention.
Peat	Peat is a partially decomposed mass of semi-carbonized vegetation which has grown under waterlogged, anaerobic conditions, usually in bogs or swamps.
Alluvium	Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.
Tidal Flat Deposits	Tidal flat deposits, including mud flat and sand flat deposits, form extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. They consist of unconsolidated sediment, mainly mud and / or sand.
Beach And Tidal Flat Deposits	Composite of 'Beach deposits': Shingle, sand, silt and clay; may be bedded or chaotic; beach deposits may be in the form of dunes, sheets or banks, and 'Tidal Flat Deposits': commonly silt and clay with sand and gravel layers; possible peat layers; from the tidal zone.
Head deposits	Polymict deposit comprises gravel, sand and clay depending on upslope source and distance from source. Locally with lenses of silt, clay or peat and organic material.

Section 1 Geology	Description
Lacustrine Deposits	They include clastic deposits, composed of coarse-grained bedload and suspended fine-grained material brought by streams flowing into the lake. Under arid and semiarid conditions evaporites form an important component of lake sediments. Includes fine-grained sediments (i.e. clay and silt), commonly laminated, and can contain thin layers of organic material or sand.
Brighton Sand Formation	Dominantly yellow to pale brown and reddish yellow slightly clayey sand to silty sand with a variably developed very dusky red to black compressible peat to clayey sandy peat base.
Hemingbrough Glaciolacustrine Formation	Unfossiliferous laminated clays, silts and sands with rare dropstones (typically fine-grained pale coloured sandstone, grey limestone and dark mudstone).
Glaciofluvial Deposits, Devensian	Includes mostly coarse-grained sediments (i.e. sand and gravel) with some finer-grained layers (i.e. clay and silt). Sand and gravel, locally with lenses of silt, clay or organic material.
Till	Till is unsorted and unstratified drift, generally over consolidated, deposited directly by and underneath a glacier without subsequent reworking by water from the glacier. It consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton).
Clay-With-Flints	The dominant lithology is orange-brown and red-brown sandy clay with abundant nodules and rounded pebbles of flint.
Bedrock Geology	
Mercia Mudstone Group	Dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum / anhydrite are widespread; thin sandstones are also present.

Section 1 Geology	Description
Sherwood Sandstone Group	Sandstone, red, yellow and brown, part pebbly; conglomeratic in lower part; pebbles generally extraformational quartz and quartzite, with some intraformational clasts; subordinate red mudstone and siltstone.

- 10.5.13 A review of publicly available information does not record landslide records or faults as present within Section 1 of the Project (Ref 10.38). A more detailed assessment will be reported in the ES.

Site Setting-Hydrogeology

- 10.5.14 Maps on Defra's 'MAGIC' mapping portal (Ref 10.37) indicates that the hydrogeology within Section 1 of the Study Area can be summarised as shown in Table 10-11.

Table 10-11 – Summary of Aquifer Classes for each Stratum within Section 1

Geology	Stratum	Aquifer Class
Superficial Deposits	Warp	Secondary A
	Peat	Unproductive Strata
	Alluvium	Secondary A
	Tidal Flat Deposits	Unproductive Strata
	Beach And Tidal Flat Deposits	Secondary Undifferentiated
	Head deposits	Secondary Undifferentiated
	Lacustrine Deposits	Secondary A
	Brighton Sand Formation	Secondary A
	Hemingbrough Glaciolacustrine Formation	Unproductive Strata
	Glaciofluvial Deposits, Devensian	Secondary A
	Till	Secondary Undifferentiated
	Clay-With-Flints	Secondary Undifferentiated
Bedrock	Mercia Mudstone Group	Secondary B Aquifer
	Huddersfield White Rock Sandstone	Secondary A Aquifer
	Sherwood Sandstone Group	Principal Aquifer

Section 1 – Ground Conditions Summary

Geological Sites of Special Scientific Interest and Regionally Important Geological sites

- 10.5.15 Geological SSSIs and Regionally Important Geological Sites (RIGS) have not been identified within Section 1 of the Study Area (Ref 10.37).
- 10.5.16 Further review of local geological groups (via the internet) will be undertaken to establish if there are any locally designated sites or GCR sites within the Study Area. These will be detailed and assessed further in the ES chapter.

Mining and Shallow Excavation

- 10.5.17 The western part of Section 1 falls within the Nottinghamshire Coal Mining Reporting Area, however on review of historical mine entries and locations, detailed on the Mining Remediation Viewer (Ref 10.42), the Project does not interact with historical mining activities or infrastructure within this section.
- 10.5.18 Further sources of information will be reviewed and appropriate details included within the ES with regards to quarries and chalk mining.

UXO Risk

- 10.5.19 Zetica Unexploded Ordnance (UXO) risk mapping within Section 1 indicates the site is a low-risk area (Ref.10.39). A low risk assessment allows for construction works to proceed without further UXO measures to be undertaken, although Zetica recommend an awareness briefing prior to construction.

Radon Risk

- 10.5.20 Review of published radon data from UK Health and Security Agency (Ref 10.43) indicates that Section 1 of the Study Area falls primarily within a maximum radon potential of <1% and therefore is considered to be of low risk and not requiring radon protective measures. However, the southern spur towards Keadby has recorded slightly higher Radon Potentials at 1-3%.

Landfills and Historical Potentially Contaminative Land Uses

- 10.5.21 Landfills are known to be potential sources of contamination and hazardous ground gas and as such are noted in baseline land assessments. The following landfill sites have been identified within the Study Area relating to Section 1 (Ref 10.40, 10.41, 10.42, 10.44, 10.45). Landfills are shown in Figure 10.3.

Table 10-12 – Landfill sites recorded adjacent to or within the draft Order Limits

Name	Interaction	Location	Active / Historic	Waste Type
Drax Power Station	Within 250 m buffer	North of Drax Power Station	Active	Ash
New Road Landfill	Within 250 m buffer	North of Drax Power Station	Historical	Inert
Barmby Cutting Landfill	Within 250 m buffer	800 m E of Barmby on the Marsh (adjacent to Station Lane)	Historical	Inert, Household, Commercial, Industrial
Asselby Landfill	Within 250 m buffer	840m W of Asselby.	Historical	Inert
Rawcliffe South Landfill	Partially within draft Order Limits	900 m SW of Rawcliffe (Adjacent to the A614)	Historical	Not detailed
Goole Fields	Within 250 m buffer	300 m SW of Goole (Adjacent to Hook Pastures Lane)	Historical	Household, Commercial, Industrial
Hook Pasture Lane / Dutch Riverside	Within 250 m buffer	150 m SW of Goole (Adjacent to Hook Pastures Lane)	Historical	Inert, Industrial
Keadby Power Station	Within draft Order Limits	Northwest of Keadby Power Station	Historical	Inert, Industrial

- 10.5.22 Section 1 of the Study Area is comprised of predominantly agricultural fields, with significant historical developments not recorded across the section. Land drains and infilled pits / ponds are likely to be present within this section and are a potential contaminative source (Ref 10.36, 10.45)
- 10.5.23 Section 1 of the route is the site of a historical railway running from Goole and forking off towards Fockerby (in the north) and Crowle (in the south). As such, there will likely be some limited interaction where the proposed pipe route crosses the historical railway route in this central / eastern part of Section 1.

Current Potentially Contaminative Land Uses

- 10.5.24 Section 1 of the Study Area is primarily agricultural land and as such current potentially contaminative land uses will be restricted to being of an agricultural basis (Ref 10.38).
- 10.5.25 Other current potentially contaminative land uses have been identified relating to transport (rail tracks and infrastructure, major highways / roadways) in addition to the proximity to significant industrial infrastructure; Drax Power Station and Landfill, Keadby Power Station. Key features are shown in Figure 10.4.

Pollution Incidents

- 10.5.26 At the time of writing, information from local authorities and the Environment Agency, have not been received regarding pollution incidents within the Study Area. Responses and information from environmental database searches (such as Groundsure reports) will be collated and detailed within the ES.

Hydrology / Surface Water Features

- 10.5.27 Chapter 18: Hydrology and Land Drainage provides full details of the surface water features that are included within the Study Area of Section 1. Surface water features are potential receptors and are considered in the assessment.

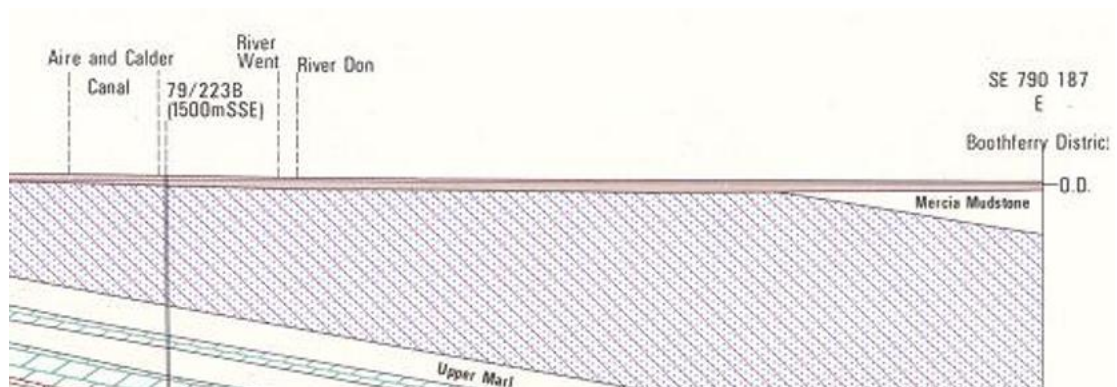
Section 1 – Hydrogeology Summary

Historical Hydrogeological Features

- 10.5.28 Historical water features have been compiled using digitised using Arc GIS and historical OS mapping (Ref 10.45) and BGS GeoIndex historical wells (Ref 10.38). These features can be seen on Figure 10.8 and are summarised below:
- Numerous historical wells, potential private water supplies (PWS), are located across the Study Area. Only 5 historical wells fall within the draft Order Limits, 4 over 30 m depth within the Sherwood Sandstone aquifer. The remaining historical well is shown as being of 0-10 m depth and of unknown target aquifer. Fifty-eight historical wells lie within the 500 m buffer zone of the draft Order Limits.
 - Springs – no historical springs are recorded in Section 1.

Groundwater Bodies, Levels and Flows

- 10.5.29 Superficial deposits are present, within the draft Order Limits, across the whole of Section 1. Hemigbrough Glaciolacustrine Formation, Warp and Alluvium are described as aquifers but where predominantly clays and silts, may act as aquitards, partially confining the underlying bedrock aquifer, where present. The superficial deposits are shown in Figure 10-1 and Table 10-10.
- 10.5.30 The bedrock in Section 1 (Figure 10-2) is predominantly Permian and Triassic Sherwood Sandstone, forming a principal aquifer in the area (Ref 10.49), which is used for public water supply. West of a north-south line through Goole, the Sherwood Sandstone lies directly beneath superficial deposits. However, to the east the bedrock is overlain by and confined by the Mercia Mudstone. Insert 10-1 presents a schematic long section of the bedrock in Mudstone, adapted from BGS.



Insert 10-1 – Section 1 Schematic Section of Sherwood Sandstone aquifer and Overlying Mudstone

- 10.5.31 The Mercia Mudstone acts as an aquitard, confining the Sherwood Sandstone aquifer.
- 10.5.32 The top of the Sherwood Sandstone is shallow in low lying areas in the catchments of the River Ouse and River Swale of North Yorkshire. This results in low hydraulic gradients in the aquifer and only small seasonal fluctuations in water levels (typically 2 to 3 m).
- 10.5.33 Both fracture and intergranular flow are important methods of groundwater movement in the Sherwood Sandstone aquifer of the Yorkshire region. It is considered that most of the fracture flow occurs in the top 100 m of the aquifer. Beneath this depth fractures are thought to be closed (Ref 10.47). Intergranular flow has a much greater importance compared to fracture flow in the Sherwood Sandstone (Ref 10.48).

Springs, Natural Discharges and Baseflow to Surface Waterbodies

- 10.5.34 No springs are mapped on the current OS 1:25 000 mapping (Ref 10.49).
- 10.5.35 The presence of superficial aquifers and sub-outcrop of the Sherwood Sandstone aquifer, suggest that at least part of the surface waterbodies, including the River Ouse and River Aire may be in hydraulic continuity and therefore may receive baseflow. Further assessment will be presented in the ES.

Designated and Non-designated Sites with Surface Water

- 10.5.36 Chapter 7: Ecology and Biodiversity, identifies ecologically sensitive sites (Figures 7.1 and 7.2). Below is a summary of sites within 500 metres of the draft Order Limits that include a surface water feature, presented here since groundwater may interact with surface water. Potential impacts from the Project on these sites and others if relevant will be assessed in the ES.
- Humber Estuary (Ramsar site, and SSSI)
 - Sugar Ponds (Local Nature Reserve)
 - Three Rivers (Local Wildlife Site)

Groundwater Flood Risk Areas

- 10.5.37 The presence of Secondary A superficial deposits and sandstone bedrock near rivers and in low lying ground, suggests the potential for groundwater flooding in Section 1. Further assessment will be presented in the ES.

Source Protection Zones

- 10.5.38 Published Source Protection Zones (SPZs) are shown on Figure 10.8 and comprise:
- SPZ1 Inner Protection Zone (closest to the groundwater source).
 - SPZ2 Outer Protection Zone (surrounds the SPZ1).
 - SPZ3 Total Catchment.
- 10.5.39 Environment Agency published SPZs are around strategic potable water abstractions, typically those used for Public Water Supply or large-scale commercial use such as hospitals or food manufacturing. Managing contamination risk to potential potable (drinking water) sources is central to the use of SPZs (Ref 10.29). The SPZ zones are based on predicted travel time of groundwater flow to the source:

- SPZ1: potential contamination could reach the source within 50 days.
- SPZ2: potential contamination could reach the source within 400 days.
- SPZ3: entire area contributing groundwater to the source; any contamination here eventually reaches the source.

10.5.40 Protection of groundwater sources is achieved by controlling activities that could cause contamination, such as restricting certain land uses and practices, e.g. chemical storage. The most stringent controls apply within a SPZ1, the area closest to the source. The Environment Agency's groundwater protection position statements (Ref 10.29) outline the restrictions required.

10.5.41 With reference to Figure 10-6, all the published SPZs in Section 1 are at the western end of the section. The draft Order Limits passes in between Carlton and Newland, passing directly over a SPZ1 and SPZ2. From Drax to West Cowick, the draft Order Limits pass through a SPZ3. Table 10-13 summarises the published geology at the SPZ1 that is crossed by the draft Order Limits.

Table 10-13 – Section 1 SPZ1 at Goose House Drain – Carlton – Anticipated Well Conditions

Criteria	Notes
Superficial Deposits	Laminated Clays and Sands (19m thick)
Bedrock	Sherwood Sandstone aquifer (aquifer source) (100m thick or more)
Estimated Abstraction Well Construction based on local BGS historical borehole records	Solid steel casing to 46mbgl. Stainless steel screen to 120 mbgl

Licensed Abstraction

10.5.42 Groundwater abstractions in England and Wales require an Environment Agency licence if more than 20 cubic metres per day is taken. These include public water supplies from a statutory water company (Ref 10.23).

10.5.43 The Environment Agency has been contacted requesting licensed abstraction data. While details are not available at the time of writing, they will be presented in the ES. Additional data will also be requested from water companies and details will be included in the ES chapter.

Private Water Supplies (PWS) and Deregulated Abstractions

- 10.5.44 A private water supply (groundwater) in England and Wales is a non-statutory water source, such as a well, borehole, or spring, used by individuals, businesses, or communities. Users typically manage and maintain these supplies, which are regulated by local authorities for quality and safety.
- 10.5.45 Deregulated abstractions are those below 20 cubic metres per day, or otherwise exempt under rules introduced in 2005, for low-risk, small-scale uses. They are potential private water supplies. An assessment will be conducted to confirm whether deregulated abstractions are operational.
- 10.5.46 Local Authorities have been contacted regarding private water supply data. North Yorkshire Council has supplied PWS locations for the Selby area and these are located outside of the Study Area, Other information is not available at the time of writing but will be included in the ES chapter.
- 10.5.47 Historical wells, described in the description of historical hydrogeological features above, are potential private water supplies. Assessment will be conducted to check if these are operational private wells and reported in the ES.
- 10.5.48 For potable water private water supplies without published SPZs, default SPZ boundaries are typically applied. Default distances for SPZs applied to private water supplies are:
- SPZ1 (Inner Zone): 50 metres radius from the source (or point of abstraction).
 - SPZ2 (Outer Zone): 400 metres radius from the source, or the area from which groundwater could reach the source in 400 days.
 - SPZ3 (Total Catchment): The entire catchment area contributing groundwater to the source.
- 10.5.49 Future assessments of private water supplies in the Study Area will include the designation of SPZs for potable supplies and the results will be presented in the ES.

Groundwater Dependent Terrestrial Ecosystems

- 10.5.50 A Groundwater-Dependent Terrestrial Ecosystem (GWDTE) is a wetland or terrestrial habitat that relies critically on groundwater flows or chemistry to maintain its ecological condition.

- 10.5.51 In the UK, GWDTEs are assessed to determine if changes to groundwater levels, flows or quality are causing significant ecological harm, as part of groundwater status classification under the Water Framework Directive.
- 10.5.52 No published GWDTE is present in Section 1 (Figure 10.8.). The presence of unpublished GWDTE will be assessed in the ES (Ref 10.50).

Nitrate Vulnerable Zones

- 10.5.53 Section 1 of the Study Area is predominantly situated within a number of surface water Nitrate Vulnerable Zones (NVZ), which are discussed in Chapter 18: Hydrology and Land Drainage.
- 10.5.54 No NVZs pertaining to groundwater are located within Section 1 of the Study Area.

WFD Groundwater Bodies

- 10.5.55 A detailed WFD assessment can be found in Volume 4 - Appendix 18.2: Water Framework Directive Assessment Stages 1 & 2. The following WFD groundwater bodies have been identified within the Study Area of Section 1 of the draft Order Limits, and are shown in Figure 10.8:

Table 10-14 – Summary of WFD Groundwater bodies in Section 1

Waterbody ID	Waterbody Name	2019 Waterbody Classification
GB40401G700600	Derwent Sherwood Sandstone	Overall: Poor Quantitative: Good Chemical: Poor
GB40401G702400	Wharfe and Lower Ouse Sherwood Sandstone	Overall: Poor Quantitative: Good Chemical: Poor
GB40401G701000	Aire & Don Sherwood Sandstone	Overall: Poor Quantitative: Poor Chemical: Poor
GB40402G992200	Idle Torne - Secondary Mudrocks	Overall: Good Quantitative: Good Chemical: Good

Waterbody ID	Waterbody Name	2019 Waterbody Classification
GB40402G990300	Trent Lower Erewash - Secondary Combined	Overall: Good Quantitative: Good Chemical: Good

- 10.5.56 The Derwent Sandstone and the Wharfe and Lower Ouse Sherwood Sandstone waterbody have a poor overall status due to a poor General Chemical Test and a poor Chemical Drinking Water Protected Area status respectively. For the Derwent Sandstone, the poor General Chemical Test relates to natural mineralisation. For the Wharfe and Lower Ouse Sherwood Sandstone waterbody, the poor Chemical Drinking Water Protected Area status suggests the groundwater quality exceeds some chemical standards set for the whole waterbody supplying drinking water (Ref 10.51). The first 7 km of the pipeline, from Drax to Newland, is within this latter waterbody.
- 10.5.57 The Aire and Don Sherwood Sandstone waterbody also has an overall poor status due to a poor Quantitative Water Balance status and a poor General Chemical Test status. This suggests that over abstraction (abstraction exceeding recharge) is occurring and some pollutants exceed standards. (Ref 10.52). 10 km of the pipeline, from Rawcliffe to south of Goole, is within this waterbody. An upward trend (deteriorating) is shown for both waterbodies. Therefore, both waterbodies are subject to significant pressures impacting their WFD status.

Section 1 – Overall Summary

Summary of the Ground Conditions and Hydrogeology at Proposed Trenchless Crossings

- 10.5.58 Table 10-15 summarises the proposed trenchless crossings in Section 1. This is because these parts of the pipeline route will be deeper than the trenched parts and therefore potentially interact more with the underlying geology and hydrogeology. Details of trenchless crossing methods are shown in Chapter 2: Project Description.

Table 10-15 – Summary of Trenchless Crossings in Section 1 and the Corresponding Geology and Hydrogeology

Crossing No.	ID	Easting	Northing	Type of feature crossed	Superficial Deposit Geology – <i>Aquifer Classification</i>	Bedrock Geology – <i>Aquifer Classification</i>
1	River Ouse	468606	427547	Watercourse	Warp Secondary A Aquifer	Sherwood Sandstone <i>Principal Aquifer</i>
2	River Ouse	468960	427135	Watercourse	Warp Secondary A Aquifer	Sherwood Sandstone <i>Principal Aquifer</i>
3	A645	468083	425170	Road	Hemingbrough Glaciolacustrine <i>Unproductive Strata</i>	Sherwood Sandstone <i>Principal Aquifer</i>
4	River Aire	466646	422796	Watercourse	Alluvium Secondary A Aquifer	Sherwood Sandstone <i>Principal Aquifer</i>
5	Wakefield and Goole Line (nearest station: Goole)	467003	422078	Railway	No superficial deposits recorded	Huddersfield White Rock - Sandstone Secondary A Aquifer
6	A614	467453	421989	Road	Brighton Sand Formation Secondary Undifferentiated	Sherwood Sandstone <i>Principal Aquifer</i>
7	M62	467419	421095	Road	Hemingbrough Glaciolacustrine <i>Unproductive Strata</i>	Sherwood Sandstone <i>Principal Aquifer</i>

Crossing No.	ID	Easting	Northing	Type of feature crossed	Superficial Deposit Geology – <i>Aquifer Classification</i>	Bedrock Geology – <i>Aquifer Classification</i>
8	M62	467429	421061	Road	Hemingbrough Glaciolacustrine <i>Unproductive Strata</i>	Sherwood Sandstone <i>Principal Aquifer</i>
9	Aire and Calder Navigation	467960	420571	Watercourse	Hemingbrough Glaciolacustrine <i>Unproductive Strata</i>	Sherwood Sandstone <i>Principal Aquifer</i>
10	Dutch River	468131	420494	Watercourse	Hemingbrough Glaciolacustrine <i>Unproductive Strata</i>	Sherwood Sandstone <i>Principal Aquifer</i>
11	M18	468482	420338	Road	Warp Secondary A Aquifer	Sherwood Sandstone <i>Principal Aquifer</i>
12	Sheffield to Hull Line	472451	420844	Railway	Warp Secondary A Aquifer	Sherwood Sandstone <i>Principal Aquifer</i>
13	A161	481322	420038	Road	Alluvium Secondary A Aquifer	Mercia Mudstone Group <i>Secondary B Aquifer</i>
14	River Trent	486701	420024	Watercourse	No superficial deposits recorded	Mercia Mudstone Group <i>Secondary B Aquifer</i>
29	A161	479146	414608	Road	Alluvium Secondary A Aquifer	Mercia Mudstone Group <i>Secondary B Aquifer</i>

Summary of Potential Receptors within Section 1

10.5.59 A summary of the potential receptors within Section 1 is shown in Table 10-16.

Table 10-16 – Summary of Section 1 Receptors

Category	Subcategory	Details / Examples
Human Health	Site Users	Residents, public open space users, industrial / commercial workers
Human Health	Construction Workers	-
Controlled Waters	Rivers	River Ouse, River Aire, River Don, Old River Don, River Trent
Controlled Waters	Canals	Aire and Calder Navigation Canal
Controlled Waters	Ponds	Identified adjacent to farm buildings across Section 1
Controlled Waters	Other water bodies	Any other rivers, streams, lakes, canals, reservoirs, and estuaries within the Study Area
Controlled Waters	Groundwater - General definition	Any water below the surface in underground strata, including Principal aquifers, Secondary A aquifers, Secondary Undifferentiated aquifers, and
Other Groundwater Receptors	Public water supply abstractions	Western end of Section 1
Other Groundwater Receptors	Private water supplies	Licensed, deregulated, and non-licensed
Other Groundwater Receptors	WFD groundwater bodies	
Other Groundwater Receptors	Surface water bodies receiving groundwater baseflow	-
Other Groundwater Receptors	Land or property susceptible to groundwater flooding	-

Category	Subcategory	Details / Examples
Other Groundwater Receptors	Designated / non-designated sites reliant on groundwater	-
Other Groundwater Receptors	GWDTE (Groundwater Dependent Terrestrial Ecosystems)	Presence of unpublished GWDTE to be assessed in the ES

- 10.5.60 The above summary includes named potential receptors as well as typical groupings of receptors of which the presence in Section 1 will be further assessed in the ES.

Section 2 – River Trent to the North Bank of the River Humber

Historical Context

- 10.5.61 The available historical maps (Ref 10.34, 10.43) show the site has remained largely undeveloped agricultural farmland since the earliest available map C.1830, with the villages of Winterton, Croxton, Wootton, and North and South Killingholme present in their current locations, though generally smaller. The new and old River Ancholme is mapped.

Site Setting – Site Walkover Summary

- 10.5.62 Section 2 extends from the River Trent in the east, to the River Humber in the west, with two spurs to the south, one towards Croxton, and the other towards South Killingholme.
- 10.5.63 From the River Trent the route continues through agricultural fields. Near the town of Winterton, the route intercepts the northern end of Winterton Landfill, an active landfill managed by FCC Environmental. The landfill is located on the side of a broad rise that slopes gently down to the west.
- 10.5.64 The route continues east through agricultural fields, towards South Ferriby, where the CEMEX South Ferriby cement works is located to the north of the route. The route crosses the River Ancholme.
- 10.5.65 The ground rises to the east of South Ferriby forming an escarpment, which continues until it meets the River Humber.
- 10.5.66 Between South Ferriby and the Barrow AGI the route passes east through generally flat agricultural fields. Approximately 600 m northeast of the Barrow AGI are two recorded sites of historical landfilling activities, either side of Calstor Road and south of the B1206. From historical mapping these two locations either side of Calstor Road were mapped as quarries and have since been infilled. The site of the western quarry / landfill is in an agricultural field, and during site walkovers evidence of the landfill's presence was not observed, likely obscured by repeated ploughing of the field smoothing out any raises or depressions in the land. The eastern quarry (landfill) location was noted to still

be partially open as a depression in the ground and surrounded by trees and shrubs.

- 10.5.67 The first southern spur extends through agricultural fields towards Croxton. Along the spur are two more historical landfills adjacent to the site. The northern historical landfill is located on the eastern edge of Barton Road and is visible as an overgrown mound above the flat surrounding agricultural land. The mound is screened from the road by a hedge. The southern landfill has been converted into Wootton Park, and slopes to the east away from Barton Road. Along the eastern margin of the ground rises into an embankment that bordered the agricultural field to the east. A series of bike tracks have been cut into this embankment and form a loop around the park. Young silver birch trees were noted in the northern part of the park with bowed trunks, curving consistently to the west, which may be an indication of shallow roots not supporting the trees as they are pushed by the prevailing wind.
- 10.5.68 The Croxton AGI is located in a flat agricultural field at the southern extent of the spur, north of Singelton Birch cement works and quarry. A gravel farm track runs roughly parallel to the southwestern margin of Croxton AGI. During the walkovers observations of the Singelton Birch cement works and quarries were made from Chalkhill road, however the southern section of the road was shut, and the view of the main buildings was screened from the road by hedges.
- 10.5.69 The main pipeline route continues through flat agricultural fields east from the Barrow AGI towards the East Halton AGI, where the second spur branches southeast.
- 10.5.70 The Killingholme AGI is located in a flat agricultural field, to the west of North Killingholme.
- 10.5.71 The spur continues further south and crosses the historical Eastfield Road Landfill, which was not directly accessible during the site walkover. Observations from the perimeter of the landfill noted that a ditch had been excavated along the southwestern margin of the landfill, and the ground level within the landfill was higher than the adjacent fields. At the eastern end of the landfill is an access gate off Eastfield Road, which leads to a hardstanding and three buildings, one large building and two smaller cabins. A large slightly rusted tank was seen adjacent to the largest building. A potential chimney is located on the western side of the largest building. On the northern edge of the access road into the landfill is a potential partially underground tank surrounded by a concrete structure. Refuse has been fly-tipped surrounding the landfill, especially at the access gate.

- 10.5.72 The main pipeline continues east through flat agricultural fields from the East Halton AGI to the eastern bank of the River Humber, which marks the end of Section 2.

Site Setting – Geology

- 10.5.73 Figure 10-1 (Superficial Geology) and Figure 10-2 (Bedrock Geology) present the published geology mapping of the superficial deposits and bedrock geology along the Project. Published geological maps and the GIS data has been sourced from the BGS (Ref.10.38).
- 10.5.74 The following geologies have been identified within Section 2; however, they may not be present across the full extent of the section. The geological units encountered within Section 2 (ordered by age) are summarised in Table 10-17 below.

Table 10-17 – Section 2 Geological Succession

Section 2 Geology	Description
Superficial Deposits	
Alluvium	Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.
Tidal Flat Deposits	Tidal flat deposits, including mud flat and sand flat deposits, form extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. They consist of unconsolidated sediment, mainly mud and / or sand.
Beach And Tidal Flat Deposits	Composite of 'Beach deposits': Shingle, sand, silt and clay; may be bedded or chaotic; beach deposits may be in the form of dunes, sheets or banks, and 'Tidal Flat Deposits': commonly silt and clay with sand and gravel layers; possible peat layers; from the tidal zone.
Head deposits	Polymict deposit: comprises gravel, sand and clay depending on upslope source and distance from source. Locally with lenses of silt, clay or peat and organic material.
Brighton Sand Formation	Dominantly yellow to pale brown and reddish yellow slightly clayey sand to silty sand with a variably developed very dusky red to black compressible peat to clayey sandy peat base.
Hemingbrough Glaciolacustrine Formation	Unfossiliferous laminated clays, silts and sands with rare dropstones (typically fine-grained pale coloured sandstone, grey limestone and dark mudstone).
Glaciofluvial Deposits, Devensian	Includes mostly coarse-grained sediments (i.e. sand and gravel) with some finer-grained layers (i.e. clay and silt). Sand and gravel, locally with lenses of silt, clay or organic material.
Till	Till is unsorted and unstratified drift, generally over consolidated, deposited directly by and underneath a glacier without subsequent reworking by water from the glacier. It consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton).
Bedrock	
Flamborough Chalk Formation	White, well-bedded, flint-free chalk with common marl seams (typically about one per metre). Common stylolitic surfaces and pyrite nodules.
Burnham Chalk Formation	White, thinly bedded chalk with common tabular and discontinuous flint bands; sporadic marl seams
Welton Chalk Formation	White, massive or thickly bedded chalk with common flint nodules ("burrow-form flints") but generally lacking tabular flint bands; sporadic marl seams.
Ferriby Chalk Formation	Grey, soft, marly, flint-free chalk, typically weathering buff in exposures; locally includes pinkish bands; some harder, gritty, shell-debris-rich beds, and thin discrete marl seams.
Kimmeridge Clay Formation	Mudstones (calcareous or kerogen-rich or silty or sandy); thin siltstone and cementstone beds; locally sands and silts.
Ampthill Clay Formation	Mudstone, mainly smooth or slightly silty, pale to medium grey with argillaceous limestone (cementstone) nodules
West Walton Formation	Calcareous mudstone, silty mudstone and siltstone, with subordinate fine-grained sandstones and argillaceous limestone (cementstone) or siltstone nodules.
Oxford Clay Formation	Silicate-mudstone, grey, generally smooth to slightly silty, with sporadic beds of argillaceous limestone nodules.
Kellaways Sand Member	Silicate sandstone and silicate siltstone, pale grey, calcareous cemented, with interbeds of sandy and silty mudstone. Sandstone / siltstone generally weakly cemented, but locally strongly cemented, typically into "doggers".
Cornbrash Formation	Limestone, medium- to fine-grained, predominantly bioclastic wackestone and packstone with sporadic peloids; generally and characteristically intensely bioturbated and consequently poorly bedded, although better bedded, commonly somewhat arenaceous units occur in places, particularly in the upper part.

Section 2 Geology	Description
Rutland Formation	Grey marine mudstone passing up into non-marine mudstone and siltstone, with a greenish-grey rootlet bed at the top.
Grantham Formation	Mudstones, sandy mudstones and argillaceous siltstone-sandstone, which is commonly ferruginous, and containing generally abundant plant debris
Lower Lincolnshire Limestone Member	Limestones, dominated by low energy calcilutite, and peloidal wackestone and packstone. Commonly includes sandy limestone or calcareous sandstone in basal part and contains substantial units of mudstone,
Raventhorpe Beds	Limestone, predominantly calcilutitic and more or less argillaceous, interbedded with calcareous mudstone and calcareous siltstone
Thorncroft Sand Member	A grey to yellow, locally bioturbated massive parallel or cross-bedded fine-grained, patchily iron-cemented but otherwise friable sandstone with plant debris, rootlets and thin lignite lenses, with thinly bedded and laminated locally sphaerosideritic and pyritic sandstone, siltstone and mudstone, seatearths and thin coals, which may include a median unit of marine fossiliferous calcareous mudstone or siltstone.
Kirton Cementstone Beds	Silicate- and calcareous mudstone, interbedded with thin and more or less argillaceous limestones (calcilutite and shelly and peloidal wackestone). Locally includes coralliferous limestone bodies (knoll reef)
Hibaldstow Limestone	Limestone, high-energy ooidal and shell bioclastic grainstones
Whitby Mudstone Formation	Medium and dark grey fossiliferous mudstone and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine-grained calcareous sandstone beds
Marlstone Rock Formation	Sandy, shell-fragmental and ooidal ferruginous limestone interbedded with ferruginous calcareous sandstone, and generally subordinate ferruginous mudstone beds.
Frodingham Ironstone Member	Sandy limestone and ironstone.
Charmouth Mudstone Formation	Dark grey laminated shales, and dark, pale and bluish grey mudstones; locally concretionary and tabular limestone beds; abundant argillaceous limestone, phosphatic or ironstone (sideritic mudstone) nodules in some areas; organic-rich paper shales at some levels; finely sandy beds in lower part in some areas.
Scunthorpe Mudstone Formation	Grey, variably calcareous and silty, blocky or fissile mudstone with thin beds of argillaceous limestone (bioclastic or micritic) and calcareous siltstone, particularly near base and in upper part.
Penarth Group	Grey to black mudstones with subordinate limestones and sandstones; predominantly marine in origin.

- 10.5.75 A review of published information across Section 2 of the route found numerous landslides have been recorded adjacent to the eastern side of the River Trent along the Hilltop / Hillside Plantation (Ref 10.38). A more detailed assessment will be performed and reported in the ES.

Site Setting – Hydrogeology

- 10.5.76 Maps on Defra's 'MAGIC' mapping portal (Ref 10.37) indicates that the hydrogeology within Section 1 of the Study Area can be summarised as shown in Table 10-18. The spatial variation of the hydrogeology for this section is shown in Figures 10.6, 10.7 and 10.8.

Table 10-18 – Summary of Aquifer Classes for each Stratum within Section 2

Geology	Stratum	Aquifer Class
Superficial Deposits	Alluvium	Secondary A
	Tidal Flat Deposits	Unproductive
	Beach And Tidal Flat Deposits	Unproductive
	Head deposits	Secondary A or Secondary Undifferentiated
	Brighton Sand Formation	Secondary A
	Hemingbrough Glaciolacustrine Formation	Unproductive
	Glaciofluvial Deposits, Devensian	Secondary A
	Till	Secondary (Undifferentiated)
Bedrock	Flamborough Chalk Formation	Principal Aquifer
	Burnham Chalk Formation	Principal Aquifer
	Welton Chalk Formation	Principal Aquifer
	Ferriby Chalk Formation	Principal Aquifer
	Kimmeridge Clay Formation	Unproductive Aquifer
	Amphill Clay Formation	Unproductive Aquifer
	West Walton Formation	Unproductive Aquifer
	Oxford Clay Formation	Unproductive Aquifer
	Kellaways Sand Member	Secondary A

Geology	Stratum	Aquifer Class
	Cornbrash Formation	Secondary A
	Rutland Formation	Unproductive Aquifer
	Grantham Formation	Secondary Undifferentiated
	Lower Lincolnshire Limestone Member	Principal Aquifer
	Raventhorpe Beds	Principal Aquifer
	Thorncroft Sand Member	Secondary A
	Kirton Cementstone Beds	Principal Aquifer
	Hibaldstow Limestone	Secondary A
	Whitby Mudstone Formation	Unproductive Aquifer
	Marlstone Rock Formation	Secondary A
	Frodingham Ironstone Member	Secondary A
	Charmouth Mudstone Formation	Secondary Undifferentiated
	Scunthorpe Mudstone Formation	Secondary B
	Penarth Group	Secondary Undifferentiated

Section 2 – Ground Conditions Summary

Geological Sites of Special Scientific Interest and Regionally Important Geological sites

- 10.5.77 One Geological SSSI has been identified within the Study Area of Section 2 (Ref 10.37). Adjacent to the draft Order Limits (700 m SE of South Ferriby), is located the South Ferriby Chalk Pit which is designated a geological SSSI because of the considerable importance in providing good sections of Upper Jurassic and Lower Cretaceous rocks. Whilst the boundary of the SSSI is within the Study Area, there is no anticipated interaction between the Project and the active and open Chalk pit which is further north. For the purpose of the PEIR, this SSSI is considered as a geological receptor in the assessment.
- 10.5.78 The Humber Estuary which is situated to the north of Section 2 Study Area is also designated as a SSSI. There is an area on the Humber Estuary which is designated for its national importance for geological interest - South Ferriby Cliff (late Pleistocene sediments). This area is outside the Study Area and therefore for the purpose of the PEIR is not considered to be a geological receptor (Ref 10.37).
- 10.5.79 Further review of local geological groups will be undertaken to establish if there are any locally designated sites or GCR sites within the Study Area. These will be detailed and assessed further in the ES chapter.

Mining and Shallow Excavation

- 10.5.80 Section 2 of the Project does not fall within a Mining Remediation Authority area, except for where the route crosses the Humber Estuary (Ref 10.42). The estuary area falls within the Nottinghamshire Mining Reporting area, however the risks posed by this are not considered to be significant with no active / historical mine workings conducted within the vicinity of the Project.
- 10.5.81 Further sources of information will be reviewed and appropriate details included within the ES with regards to quarries and chalk mining.

UXO Risk

- 10.5.82 Unexploded Ordnance (UXO) risk mapping within Section 2 indicates the site is a low-risk area (Ref.10.39). A low risk assessment allows for construction works to proceed without further measures although an awareness briefing prior to construction is recommended.

Radon Risk

- 10.5.83 Review of published radon data from UK Health and Security Agency (Ref 10.43) indicates that the radon potential across Section 2 varies greatly; the western side of the section from the River Trent to Winterton falls within the highest Radon Potential of 10-30%. Moving eastwards, the radon potential decreases, with the majority of the area having a maximum radon potential of <1%, with occasional increases to 1-3%.

Landfills and Historical Potentially Contaminative Land Uses

- 10.5.84 Landfills are known to be potential sources of contamination and hazardous ground gas and as such are noted in baseline land assessments. Table 10-19 shows the landfill sites that have been identified within the Study Area of Section 2 (within 250 m) (Ref 10.36, 10.40, 10.45).

Table 10-19 – Landfill Sites Recorded Adjacent to or within the draft Order Limits

Name	Interaction	Location	Active / Historic	Waste Type
Winterton North Landfill	Partially within draft Order Limits	1.2 km W of Winterton (South of Coleby Lane)	Historical	Inert, Household, Commercial, Industrial
Winterton South Landfill	Within 250 m buffer	1.2 km W of Winterton (South of Coleby Lane)	Active	Hazardous
South Ferriby Works Landfill	Within 250 m buffer	1.6 km W of South Ferriby (south of Sluice Lane)	Active	Industrial
Chapel Farm Landfill	Within 250 m buffer	3.1 km SW of Barton-upon-Humber (Adjacent to Brigg Road)	Historical	Industrial
Barrow Grange Landfill (2 pits)- Former Quarries	Within draft Order Limits	1.9 km SW of Barrow-upon-Humber (adjacent to the B1206)	Historical	Household, Industrial
Thornton Curtis Landfill	Within 250 m buffer	1 km W of Thornton Curtis (adjacent to Barton Road)	Historical	Inert
Barton Road Landfill	Within 250 m	800 m W of Wootton (situated within the now Wootton Pocket Park)	Historical	Inert, Household, Commercial, Industrial
Campwood Landfill	Within 250 m	1.4 km W of Croxton (Adjacent to the A180)	Active	Industrial

Name	Interaction	Location	Active / Historic	Waste Type
Eastfield Road Landfill	On-site	550 m N of South Killingholme (adjacent to Eastfield Road)	Historical	Inert, Household, Commercial, Industrial
Lindsey Oil Refinery Site A and C	Within 250 m	Within North Killingholme (220 m E of East Field Road)	Historical	Inert, Household, Industrial
East Halton Landfill	Within 250 m	2.1 km E of East Halton (adjacent to the River Humber)	Historical	Inert, Household, Industrial
North Killingholme Landfill (Humber Sea Terminals)	Within 250 m	1.9 km E of East Halton	Historical	Inert
Clough Lane Landfill	Within 250 m	1.8 km E of East Halton (adjacent to Clough Lane)	Historical	Inert
Petrofina Landfill	Within 250 m	2.3 km E of East Halton (adjacent to Humber Sea Terminal and Haven Road)	Historical	Inert

- 10.5.85 Section 2 of the Study Area is comprised of predominantly agricultural fields, with significant historical developments not recorded across the section. Land drains and infilled pits / ponds are likely to be present within this section and are a potential (low risk) contaminative source (Ref 10.36, 10.45)
- 10.5.86 As per the above table, there are two historical landfill sites situated within the draft Order Limits within Section 2 of the Study Area, these will be considered as likely sources of contamination within this section (Ref 10.40)
- 10.5.87 Within Section 2 of the Study Area, a historical railway (the Winteringham Branch of the Great Central Railway), has been identified, running from Winteringham in the north to Scunthorpe in the south. There will likely be some limited interaction where the proposed pipe route crosses the historical railway route in the west of Section 2.
- 10.5.88 Given the geographical links to the North Sea, the Humber region was a significant industrial centre during the 20th century and therefore on the eastern part of Section 2 there will likely be legacy infrastructure and potential contamination sources such as the former gas works and brick, and tile works situated there.

Current Potentially Contaminative Land Uses

- 10.5.89 Section 2 of the Study Area is primarily agricultural land and as such current potentially contaminative land uses will be restricted to being of an agricultural basis. (10.34, 10.35)
- 10.5.90 The proposed Study Area in Section 2 interacts with the northern half of the Winterton Landfill North which is a historical landfill. The landfill accepted inert, household, commercial, and industrial wastes. The landfill was filled from the north to the south, with the northern section of the landfill being the older waste material. The landfill is known to be capped and restored, however given the age of the northern section of the landfill the capping is considered to be just a clay cap, with no further mitigation measures. The restored land of the landfill is now utilised as a Solar Panel farm.
- 10.5.91 Winterton Landfill South is a separate landfill to Winterton Landfill North, situated to the south of the Study Area. Winterton Landfill South is an active landfill accepting hazardous wastes. the Project is not considered to interact with this area however this will need to be confirmed by the Landfill operators once they have confirmed their operating boundaries.

- 10.5.92 Other current potentially contaminative land uses have been identified relating to transport (rail tracks and infrastructure) in addition to the industry situated on the banks of the River Humber (Prax Lindsey Oil Refinery, Killingholme Power Station, Humber Sea Terminal), in addition to the commercial businesses associated with logistics.

Pollution Incidents

- 10.5.93 At the time of writing, information from local authorities / the Environment Agency, have not been received regarding pollution incidents within the Study Area. Responses and information from environmental database searches (such as Groundsure reports) will be collated and detailed within the ES.

Hydrology / Surface Water Features

- 10.5.94 Chapter 18: Hydrology and Land Drainage provides full details of the surface water features that are included within the Study Area of Section 2. Surface water features are potential receptors and are considered in the assessment.

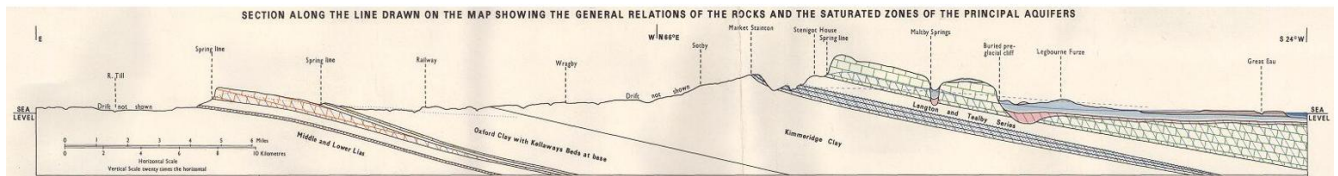
Section 2 – Hydrogeology Summary

Historical Hydrogeological Features

- 10.5.95 Historical water features, based on historical OS maps (Ref 10.45), BGS GeoIndex historical wells and the BGS (Ref 10.38) hydrogeological map, are presented on Figure 10.8 and are summarised below:
- Nearly thirty historical wells are within the draft Order Limits and over 200 historical wells lie within the 500 m buffer zone.
 - 7 historical springs are located close to South Ferriby and Winteringham.
 - Fourteen other historical springs are mapped inland from the western banks of the River Humber, near Goxhill and Habrough.

Groundwater Bodies, Levels and Flows

- 10.5.96 The hydrogeology of Section 2 is summarised in Insert 10-2, adopted from BGS (Ref 10.50).



Insert 10-2 – Section 2 Bedrock Aquifers West to East Cross Section

- 10.5.97 Insert 10-2 shows eastwards dipping strata, with the Lincolnshire Limestone and the Chalk forming prominent escarpments. These two rocks are regionally important principal aquifers. Both are important for water supply and both outcrop (unconfined) at high ground where they receive direct rainfall recharge. Down dip, both become semi confined or confined by overlying lower permeability strata.
- 10.5.98 In the northern Lincolnshire Chalk, groundwater flows from the unconfined aquifer to the confined aquifer, with some flow escaping as seasonal springs at the edge of the Till, representing the overflow from the Chalk. The confined aquifer becomes artesian, and springs occur through thin or permeable patches in the superficial deposits (Ref 10.49).
- 10.5.99 Borehole logs from the confined Chalk aquifer in north Lincolnshire give a clear indication that water flow is restricted to the upper 30–40 m of the Chalk. Logs also show that flow is often through a small number of major fracture zones (BGS, 1997). The top surface of the buried Chalk comprises a chalk gravel, the Chalk Bearings, and this is of high permeability and often a major inflow zone in productions wells. Fossil groundwater exists at much greater depth within the Chalk and is of poor quality.
- 10.5.100 Groundwater movement on a regional scale tends to follow the dip of the Chalk; flow is away from a groundwater divide which closely parallels the Chalk escarpment (Ref 10.49). Groundwater flow on a local scale across Section 2 is influenced by abstractions but overall is expected to flow towards the north and to the east, towards the River Humber. Dissolution features may also have caused locally greater permeable zones and solution features, and these may affect flow paths within the aquifer.
- 10.5.101 Hydraulic continuity may exist between the Chalk aquifer and over- or underlying units. Overlying units that are likely to provide leakage to the aquifer include sand and gravel deposits (Ref 10.49). Beneath the River Humber the Chalk aquifer groundwater levels are expected to be artesian.

Springs, Natural Discharges and Baseflow to Surface Water Bodies

- 10.5.102 Springs are important in parts of Section 2, although past over abstraction (public water supply and industrial uses) was a cause for reduced spring flow. The Lincolnshire Chalk rivers are spring fed and include East Holten Brook that is crossed by the draft Order Limits.
- 10.5.103 Blow wells are recorded in the North Lincolnshire Chalk and are stated as a type of spring caused by artesian conditions on the coastal plain where water has pushed up through low permeability (clayey) cover. Blow wells are recorded on BGS borehole historical records at East Halton.
- 10.5.104 Natural discharge of groundwater beneath the River Humber is expected due to the artesian conditions in the Chalk aquifer and variable permeability of overlying superficial deposits within the draft Order Limits.

Designated and Non-Designated Sites with Surface Water

- 10.5.105 Chapter 7: Ecology and Biodiversity, identifies ecologically sensitive sites (Figures 7.1: Designated Sites and 7.2: Non-Designated Sites). Sites within 500 metres of the draft Order Limits with surface water features are summarised below, due to known or possible groundwater interaction. Potential impacts will be assessed and reported in the ES.
- Humber Estuary (Ramsar site, SAC, SSSI)
 - Killingholme Haven Pits (Local Wildlife Site)
 - Halton Marsh Clay Pits (Local Wildlife Site)
 - Dawson City Clay Pits (Local Wildlife Site)

Groundwater Flooding Risk

- 10.5.106 Flooding risk is presented in Chapter 18: Hydrology and Land Drainage. Additionally further groundwater flooding risk information is presented below.
- 10.5.107 The Project Groundwater (Greater Lincolnshire) website presents examples of groundwater flood risk challenges including at Barton-Upon-Humber where flooding which had ceased due to groundwater abstraction become a risk again due to reduced pumping. Also, neighbouring Barrow-upon-Humber is stated as having had groundwater flooding due to spring activation, related to the Lincolnshire chalk streams (Ref 10.56). These and other relevant groundwater flood risk examples will be assessed and reported in the ES.

Source Protection Zones

10.5.108 The draft Order Limits crosses published SPZs within Section 2 and these are shown on Figure 10.8.

10.5.109 All the SPZs are located around Barton-upon-Humber and Barrow-upon-Humber, extending south towards Elsham and Ulceby. The draft Order Limits cross four SPZ1 and SPZ2 areas: north of Winterton, south west of Barrow Upon Humber, north of Thornton Curtis and west of North Killingholme. A summary of the assessed ground conditions at the SPZ1s crossed by the draft Order Limits is shown in Table 10-20 to Table 10-22.

Table 10-20 – SPZ1 Ground Conditions at Winterton Area

Criteria	Notes
Superficial Deposits	Mostly clay (44m thick)
Bedrock	Lincolnshire Limestone (aquifer source)
Anticipated well construction based on local BGS historical borehole records	Plain casing (grouted) to 44mbgl Open hole between 44.6 to 58.6mbgl

Table 10-21 – SPZ1 Ground Conditions at Barrow Area

Criteria	Notes
Superficial Deposits	Mostly no mapped superficial deposits. Elsewhere there is Till within the SPZ1. Also narrow long outcrop of Head Deposits indicating small valley features.
Bedrock	Chalk (aquifer source)
Anticipated well construction based on local BGS historical borehole records	No details available

Table 10-22 – SPZ1 – Ground Conditions at Goxhill Area

Criteria	Notes
Superficial Deposits	No details but assumed to be Till. Estimated as approximately 10m thick, based on a borehole record from Gamers Hill, Goxhill
Bedrock	No details but assumed to be Chalk (aquifer source)
Anticipated well construction based on local BGS historical borehole records	No details available

Licenced Abstraction

- 10.5.110 The Environment Agency has been contacted for abstraction licence information, which will be included in the ES when available. The published SPZ mapping shows at least 8 large, licensed abstractions for potable water which are within or are close to the Study Area. Previous reporting by National Grid (2022) reports four spray irrigation groundwater abstraction licences outside of the Study Area. Further data will be requested from water companies and detailed in the ES chapter.

Private Water Supplies (PWS)

- 10.5.111 Local Authorities have been contacted regarding private abstractions. Details have not been made available at the time of writing but will be included in the ES chapter.

Groundwater Dependent Terrestrial Ecosystems

- 10.5.112 The GWDTE in Section 2 comprises the whole width of the extensive Humber Estuary (Ramsar site, SSSI and SPA), as shown in Figure 10.8. This is expected due to the importance of the Chalk springs at the coastal plain. Further information about the importance of the GWDTE status will be gained from consultation with the Environment Agency.

Nitrate Vulnerable Zones

- 10.5.113 Section 2 of the Study Area is predominantly situated within a number of Nitrate Vulnerable Zones (NVZ), relating to surface water. These are discussed in Chapter 18: Hydrology and Land Drainage.

- 10.5.114 There are two NVZs for groundwater in Section 2. These zones comprise:
- Lincolnshire Limestone
 - Lincolnshire Chalk

Water Framework Directive Groundwater Bodies

- 10.5.115 The following WFD groundwater bodies have been identified within the Study Area of Section 2 of the draft Order Limits and are shown in Figure 10.8.

Table 10-23 – Summary of Groundwater WFD Bodies in Section 2

Waterbody ID	Waterbody Name	2019 Waterbody Classification
GB40402G990300	Trent Lower Erewash - Secondary Combined	Overall: Good Quantitative: Good Chemical: Good
GB40402G445800	Grimsby Ancholme Frodingham Ironstone Unit	Overall: Good Quantitative: Good Chemical: Good
GB40401G444600	Grimsby Ancholme Louth Limestone Unit	Overall: Good Quantitative: Good Chemical: Good
GB40401G401500	North Lincolnshire Chalk Unit	Overall: Poor Quantitative: Poor Chemical: Poor

- 10.5.116 The North Lincolnshire Chalk Unit has an overall poor status due to a poor Quantitative Dependent Surface Water Status, a poor Chemical Drinking Water Protected Area and a poor General Chemical Test. An upward trend (deteriorating) is shown (Ref 10.59). This suggests that the Chalk aquifer is experiencing significant pressures from over abstraction (reduced groundwater flow to surface water) and pollution issues in the area covering the whole waterbody supplying drinking water. This will be further assessed and reported in the ES in relation to the Project.

Proposed Trenchless Crossings in Section 2

- 10.5.117 Table 10-24 below summarises proposed trenchless crossings in Section 2. This is because these parts of the pipeline route will be deeper than the

trenched parts and therefore potentially interact more with the underlying geology and hydrogeology. Details of trenchless crossing methods are shown in Chapter 2: Project Description.

Table 10-24 – Summary of Crossings in Section 2 and the corresponding Geology / Hydrogeology

Trenchless Crossing No.	ID	Easting	Northing	Type of feature crossed	Superficial Deposit Geology	Bedrock Geology
15	Halton Drain	491000	419865	Watercourse	Alluvium Secondary A Aquifer	Frodingham Ironstone <i>Secondary A Aquifer</i>
16	A1077	494116	420446	Road	Till Secondary Undifferentiated	Hibaldstow Limestone <i>Secondary A Aquifer</i>
17	New River Ancholme	497394	419520	Watercourse	Alluvium Secondary A Aquifer	Westwalton Formation <i>Unproductive</i>
18	A15	502531	418948	Road	No superficial deposits recorded	Welton Chalk Formation <i>Principal Aquifer</i>
19	A1077	507907	419460	Road	Till Secondary Undifferentiated	Burnham Chalk Formation <i>Principal Aquifer</i>
20	Barton Line (closest station: Thornton Abbey)	510804	419153	Railway	Head Secondary A Aquifer	Burnham Chalk Formation <i>Principal Aquifer</i>

Trenchless Crossing No.	ID	Easting	Northing	Type of feature crossed	Superficial Deposit Geology	Bedrock Geology
21	East Halton Beck	512070	419499	Watercourse	Glaciofluvial Sheet <i>Secondary A Aquifer</i>	Burnham Chalk Formation <i>Principal Aquifer</i>
22	East Halton Beck	513144	422224	Watercourse	Tidal Flat Deposits <i>Unproductive</i>	Burnham Chalk Formation <i>Principal Aquifer</i>
24	River Humber	516391	423798	Watercourse	No superficial deposits recorded	Flamborough Chalk Formation <i>Principal Aquifer</i>
30	A180	508908	412687	Road	No superficial deposits recorded	Welton Chalk Formation <i>Principal Aquifer</i>

Summary of Potential Receptors within Section 2

10.5.118 A summary of potential receptors in Section 2 is shown in Table 10-25.

Table 10-25 – Potential Receptors within Section 2

Category	Subcategory	Details / Examples
Human Health	Site Users	Residents, public open space users, industrial / commercial workers
Human Health	Construction Workers	-
Geology	SSSI	South Ferriby Chalk Pit
Controlled Waters	Rivers	River Trent, Halton Drain, Old River Ancholme, New River Ancholme, River Humber, West Drain, East Drain
Controlled Waters	Other watercourses	East Halton Beck and unnamed drains across Section 2
Controlled Waters	Ponds	Ponds at Melton Ross Quarries, Ponds at Pelham House Caravan Park, Ponds at former East Halton Brick and Tile works
Controlled Waters	Other water bodies	Any other rivers, streams, lakes, canals, reservoirs, and estuaries within the Study Area
Controlled Waters	Groundwater - General definition	Any water below the surface in underground strata, including Principal aquifers, Secondary A aquifers, Secondary Undifferentiated aquifers, and
Other Groundwater Receptors	Public water supply abstractions	
Other Groundwater Receptors	Private water supplies	Licensed, deregulated, and non-licensed
Other Groundwater Receptors	WFD groundwater bodies	See WFD information above.
Other Groundwater Receptors	Surface water bodies receiving groundwater baseflow	-

Category	Subcategory	Details / Examples
Other Groundwater Receptors	Land or property susceptible to groundwater flooding	-
Other Groundwater Receptors	Designated / non-designated sites reliant on groundwater	-
Other Groundwater Receptors	GWDTE (Groundwater Dependent Terrestrial Ecosystems)	Humber Estuary (published). Presence of unpublished GWDTE to be assessed in the ES

Section 3 – North Bank of the River Humber to the Coast North of Easington

Historical Context

- 10.5.119 The available historical maps (Ref. 10.36, 10.45) show the site has remained largely undeveloped agricultural farmland since the earliest available map C.1830, with the villages of Paull, Patrington and Easington. The Hull and Holderness railway is mapped running east to west. Nearby these population centres, industry such as gas works, flax mills, windmills and brick and tile works have been identified. From the 1950s onwards, the petrochemical and gas works present today in the village of Easington are developed, as well as the Salt End Power Station (and adjoining chemical park).

Site Setting – Site Walkover Summary

- 10.5.120 Section 3 extends from the eastern bank of the River Humber eastwards towards the coast, north of Easington, with a single spur to the north connecting to the Salt End Chemical Park.
- 10.5.121 The eastern bank of the River Humber is a tidal mudflat, with flood defence earthworks constructed along the coast. Behind the flood defences are flat agricultural fields. The northern spur extends towards the Salt End Chemical works and terminates at the Salt End inlet AGI, which is located in the northwestern corner of a flat agricultural field and bounded by flood defence earthworks to the north and west. A row of electrical pylons crosses the field to the south of the AGI.
- 10.5.122 The main pipeline route continues east through flat agricultural fields bounded by hedges and field drains. South of Keyingham village the route passes the Ottringham Very-High-Frequency Omnidirectional Range Aid (VOR) station, a radio navigation station which comprises a concrete structure underneath an array of radio equipment.
- 10.5.123 Progressing further east, the route continues around a business park containing a scrap yard and mechanic / garage. During the walkover access into the scrap yard was not possible, however observations were made from the exterior. The scrapyards contain multiple tanks, barrels and IBCs, piles of scrap metal and associated metal sorting facilities. A public footpath runs adjacent to the northern border of the scrapyards, following the route of Winestead Drain (a small river).

- 10.5.124 The route continues roughly east, passing through agricultural fields to the north of Patrington to the BVS-3 AGI, which is located in a flat agricultural field directly north of Wakefield Lane. Wakefield Lane is on an embankment and is raised approximately 40-50 cm above the level of the surrounding fields. A field drain follows the field margin on the northwestern edge of the BVS-3 AGI.
- 10.5.125 East from the BVS-3 AGI the route continues through flat agricultural fields until its termination at Easington. The Easington Pump Facility on would be located in generally flat agricultural fields separated by field drains. There are two series of pylons carrying power lines that cross the fields, running generally east to west.
- 10.5.126 South of the Easington is the Perenco gas works and Centrica gas storage facility, which are two large natural gas processing and storage plants directly adjacent to the route. To the east of the gas storage facility, the land drops away steeply, forming an approximately 12-15 m high cliff. The base of the cliff is Dimlington beach, on the coast of the North Sea.

Site Setting – Geology

- 10.5.127 Figure 10.1: Superficial Geology and Figure 10.2: Bedrock Geology present the published geology mapping of the superficial deposits and bedrock geology along the Project route. Published geological maps and the GIS data has been sourced from the BGS (Ref.10.38).
- 10.5.128 The following geologies have been identified within Section 3; however, they may not be present across the full extent of the section. The geological units encountered within Section 3 (ordered by age) are summarised in Table 10-26 below.

Table 10-26 – Section 3 Geological Succession

Section 3 Geology	Description
Superficial Deposits	
Tidal Flat Deposits	Tidal flat deposits, including mud flat and sand flat deposits, form extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. They consist of unconsolidated sediment, mainly mud and / or sand.
Beach And Tidal Flat Deposits	Composite of 'Beach deposits': Shingle, sand, silt and clay; may be bedded or chaotic; beach deposits may be in the form of dunes, sheets or banks, and 'Tidal Flat Deposits': commonly silt and clay with sand and gravel layers; possible peat layers; from the tidal zone.
Till	Till is unsorted and unstratified drift, generally over consolidated, deposited directly by and underneath a glacier without subsequent reworking by water from the glacier. It consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton).
Kelsey Hill Gravels	Muddy sand and gravel with subordinate smooth red-brown clay.
Bedrock	
Flamborough Chalk Formation	White, well-bedded, flint-free chalk with common marl seams (typically about one per metre). Common stylolitic surfaces and pyrite nodules.

- 10.5.129 From a review of publicly available information, landslide records and faults are not recorded as present within Section 3 of the Project (Ref 10.38). A more detailed assessment will be performed for the ES.

Site Setting – Hydrogeology

- 10.5.130 Maps on Defra's 'MAGIC' mapping portal (Ref 10.37) indicates that the hydrogeology within Section 3 of the Study Area can be summarised as shown in Table 10-27.

Table 10-27 – Summary of Aquifer Classes for each Stratum within Section 3

Geology	Stratum	Class
Superficial Deposits	Tidal Flat Deposits	Unproductive Aquifer
	Beach And Tidal Flat Deposits	Secondary Undifferentiated
	Till	Secondary Undifferentiated
	Kelsey Hill Gravels	Secondary A
Bedrock	Flamborough Chalk Formation	Principal Aquifer

Section 3 – Ground Conditions Summary

Geological Sites of Special Scientific Interest and Regionally Important Geological sites

- 10.5.131 One Geological SSSI and Regionally Important Geological Site (RIGS) has been identified within the Study Area within Section three; Dimlington Cliffs SSSI (Ref 10.37). This is present where the Project meets the North Sea. The SSSI is subject to rapid coastal erosion (please refer to Chapter 20: Coastal Processes) and is designated for its Quaternary stratigraphy - Quaternary of East England.
- 10.5.132 As detailed above the Humber Estuary is also designated as a SSSI. The area of Spurn Head is designated a geological SSSI due to the unique coast geomorphology in that area. This area is however to the south of the Study Area and therefore for the purpose of the PEIR is not considered to be a geological receptor (Ref 10.37).

- 10.5.133 Further review of local geological groups (via the internet) will be undertaken to establish if there are any locally designated sites or GCR sites within the Study Area. These will be detailed and assessed further in the ES chapter.

Mining and Shallow Excavation

- 10.5.134 Based on the information viewed to date, the Project does not interact with historical coal mining activities or infrastructure within the Study Area of Section 3 (Ref 10.42). Further sources of information will be reviewed and appropriate details included within the ES with regards to quarries and chalk mining.

UXO Risk

- 10.5.135 UXO risk mapping within Section 3 indicates the site is a low-risk area (Ref.10.39). A low risk assessment allows for construction works to proceed without further measures although an awareness briefing prior to construction is recommended.

Radon Risk

- 10.5.136 Review of published radon data from UK Health and Security Agency (Ref 10.43) indicates that the majority of the Study Area has a maximum radon potential of <1%. With an elevated Radon potential noted in 1 location within Section 3, at landfall south of Paull, on the northern bank of the River Humber, where a Radon potential of 1-3%.

Landfills and Historical Potentially Contaminative Land Uses

- 10.5.137 Landfills are known to be potential sources of contamination and hazardous ground gas and as such are noted in baseline land assessments. The following Landfill sites have been identified within the draft Order Limits (within 250 m buffer) (Ref 10.38,10.41,10.45).

Table 10-28 – Landfill Sites Recorded Adjacent to or within the draft Order Limits

Name	Interaction	Location	Active / Historic	Waste Type
Paull Holme Quarry Landfill	Within 250 m	2.2 km SE of Paull (adjacent to Thorngumbald Road)	Historical	Inert
Southwest Corner of Cowhill Landfill	Within 250 m	2.1 km SE of Paull (adjacent to Thorngumbald Road)	Historical	Inert
Boyes Lane Landfill	Within 250 m	500 m SW of Keyingham (adjacent to Boyes Lane)	Historical	Inert, Household
Ken Hill Landfill	Within 250 m	850 m W of Keyingham (adjacent to the A1033)	Historical	Inert, Household, Commercial, Industrial
Mill Hill Landfill Site	Within 250 m	675 m W of Keyingham (adjacent to the A1033)	Historical	Inert

- 10.5.138 Across the predominantly agricultural fields across the whole of Section 3, numerous land drains and former ponds are mapped (as per the East Riding of Yorkshire Council dataset, Ref 10.41). These former drainage features may be subject to infilling and the composition of what they have been infilled within is unknown which could pose a potential risk from a contaminated land perspective. In addition to the aforementioned mapped historical infilled locations there are potentially numerous unmapped / recorded features within the agricultural land.
- 10.5.139 Within the East of Section 3, the Study Area interacts with the historical Hull and Holderness railway, with the Hull to Withernsea section of the railway being present northeast of Partington (Ref 10.36, 10.45)

Current Potentially Contaminative Land Uses

- 10.5.140 The land use across Section 3 of the Study Area is predominantly agricultural fields, there may be potential contaminative sources originating from farming practices and infilling of features such as former ponds and land drains (Ref 10.36, 10.37).
- 10.5.141 In the west of Section 3 within the northern spur is the active Salt End Power Station, and adjacent Salt End Chemicals Park. Both of these industrial features could be potentially contaminative. In the central section, the Study Area borders a scrapyard and garage, west of Patrington.
- 10.5.142 In the east of Section 3 at Landfall (from the North Sea) are two industrial Gas companies (Perenco and Gassco) with natural gas storage facilities. These facilities are not within the Study Area and lie directly adjacent.

Pollution Incidents

- 10.5.143 At the time of writing, information from local authorities / the Environment Agency, have not been received regarding pollution incidents within the Study Area. Responses and information from environmental database searches (such as Groundsure reports) will be collated and detailed within the ES.

Hydrology / Surface Water Features

- 10.5.144 Chapter 18: Hydrology and Land Drainage provides full details of the surface water features that are included within the Study Area of Section 3. Surface water features are potential receptors and are considered in the assessment.

Section 3 – Hydrogeology Summary

Historical Hydrological Features

- 10.5.145 Historical water features have been collated using and historical OS mapping (Ref 10.45) and use of BGS GeoIndex historical wells (Ref 10.38). These features are summarised below:
- There are approximately five BGS historical wells located in the Section 3 Study Area, none of which fall within the draft Order Limits. Most of these are recorded as greater than 30 metres in depth and target the Chalk aquifer.
 - There are two historical OS mapped wells, located within the Study Area but outside of the Order Limits, just south of Thorngumbald and another slightly to the west of Ryehill.
 - No historical springs are recorded in Section 3.

Groundwater Bodies, Levels and Flows

- 10.5.146 The Chalk in Yorkshire ranges from unconfined in the Yorkshire Wolds, through semi-confined in the Hull catchment, to fully confined in Holderness (Ref 10.49). The Holderness Chalk aquifer is rarely used due to limited groundwater circulation and poor water quality (Ref 10.49). Groundwater generally flows from the Yorkshire Wolds, emerging as springs or being pumped from semi-confined zones. In Holderness, groundwater levels are near surface and may be artesian locally (Ref 10.50).
- 10.5.147 Transmissivity in Holderness is low because fissure enlargement by dissolution is limited (Ref 10.50). Confined aquifer waters near the coast show mixing between fresh Chalk groundwater and seawater; some studies suggest they contain palaeowater dating back to interglacial periods. (Ref 10.50).

Designated and Non-Designated Sites with Surface Water

- 10.5.148 Chapter 7: Ecology and Biodiversity, identifies ecologically sensitive sites (Figures 7.1: Statutory Designated Sites and 7.2: Non-Statutory Designated Sites). Sites within 500 metres of the draft Order Limits with surface water features are summarised below, due to known or possible groundwater interaction. Potential impacts will be assessed in the ES.
- Humber Estuary (Ramsar site, SAC, SSSI)
 - At the coastline, south of Easington and the proposed Project landfall, lies The Lagoon SSSI, which is outside of the Study Area, being over 1 km away from the draft Order Limits.

Source Protection Zones

- 10.5.149 No published SPZs are located in Section 3 within the Study Area.

Licensed Abstraction

- 10.5.150 The absence of published SPZs and stated low aquifer transmissivity discussed above, suggest no large groundwater abstractions are located in Section 3. However, although details are not available at the time of writing, they will be presented in the ES. Additional data will be requested from water companies, if relevant and details will be included in the ES chapter.

Private Water Supplies (PWS)

- 10.5.151 Local Authorities have been contacted regarding private abstractions. Whilst details are not available at the time of writing, details will be presented in the ES chapter.

Groundwater Dependent Terrestrial Ecosystems

- 10.5.152 No published GWDTEs are present in Section 3. However, the published GWDTE for the whole of the adjacent Humber Estuary is noted.

Nitrate Vulnerable Zones

- 10.5.153 Section 3 of the Study Area is predominantly situated within a number of Nitrate Vulnerable Zones (NVZ), relating to surface waters, these are discussed within Chapter 18: Hydrology and Land Drainage.
- 10.5.154 NVZ's pertaining to Groundwater have not been identified within Section 3 of the Study Area

Water Framework Directive Groundwater Bodies

- 10.5.155 The following WFD groundwater bodies have been identified within the Study Area of Section 3 of the draft Order Limits.

Table 10-29 – Summary of Groundwater WFD Bodies in Section 3

Waterbody ID	Waterbody Name	2019 Waterbody Classification
GB40401G700700	Hull and East Riding Chalk	Overall: Poor Quantitative: Poor Chemical: Poor

- 10.5.156 The Hull and East Riding Chalk has an overall poor status due to a poor Quantitative Saline Intrusion status, a poor status for the Chemical Drinking Water Protected Area, a poor Chemical GWDTE Test and a poor General Chemical Test. An upward trend (deteriorating) is shown. These results show the waterbody faces significant pressures. These include possible over pumping near the coast, causing saline water to have encroached into freshwater aquifers in this area, reducing available fresh groundwater and causing deterioration in the overall waterbody. Further assessment, in relation to the Project, will be presented in the ES.

Summary of Trenchless Crossings in Section 3

- 10.5.157 Table 10-30 below summarises proposed trenchless crossings in Section 3. This is because these parts of the pipeline route will be deeper than the trenched parts and therefore potentially interact more with the underlying geology and hydrogeology. Details of trenchless crossing methods are shown in Chapter 2: Project Description.

Table 10-30 – Summary of Trenchless Crossings in Section 3 and the Corresponding Geology and Hydrogeology

Trenchless Crossing No.	ID	Easting	Northing	Type of feature crossed	Superficial Deposit Geology	Bedrock Geology
25	Winestead Drain	528828	423051	Watercourse	Tidal Flat Deposits Unproductive	Flamborough Chalk Formation Principal Aquifer
26	Winestead Drain	529692	423366	Watercourse	Tidal Flat Deposits Unproductive	Flamborough Chalk Formation Principal Aquifer
27	A1033 – Winestead Lane	530013	423679	Road	Till Secondary Undifferentiated	Flamborough Chalk Formation Principal Aquifer
28	A1033 – Hollym Road	532426	423576	Road	Till Secondary Undifferentiated	Flamborough Chalk Formation Principal Aquifer

- 10.5.158 The above table does not include a description of ground conditions at Easington Landfall as this is described in the Section 3 – Intertidal Summary.

Summary of Potential Receptors within Section 3

Table 10-31 – Potential Receptors within Section 3

Category	Subcategory	Details / Examples
Human Health	Site Users	Residents, public open space users, industrial / commercial workers
Human Health	Construction Workers	-
Designated site - geology		Dimlington Cliffs SSSI
Controlled Waters	Rivers	River Humber
Controlled Waters	Other watercourses	Thorngumbald Drain, South Pasture Drain
Controlled Waters	Ponds	Ponds at Newton Garth Cottages. Ponds at Rose Hill Farm. Pond at Berrygate Hill Nurseries.
Controlled Waters	Other water bodies	Any other rivers, streams, lakes, canals, reservoirs, and estuaries within the Study Area
Controlled Waters	Groundwater - General definition	Any water below the surface in underground strata, including Principal aquifers, Secondary A aquifers, Secondary Undifferentiated aquifers, and
Other Groundwater Receptors	Private water supplies	Licensed, deregulated, and non-licensed
Other Groundwater Receptors	WFD groundwater bodies	

Category	Subcategory	Details / Examples
Other Groundwater Receptors	Surface water bodies receiving groundwater baseflow	-
Other Groundwater Receptors	Land or property susceptible to groundwater flooding	-
Other Groundwater Receptors	Designated / non-designated sites reliant on groundwater	-
Other Groundwater Receptors	GWDTE (Groundwater Dependent Terrestrial Ecosystems)	Humber Estuary (published). Presence of unpublished GWDTE to be assessed in the ES

Section 3 – Intertidal Summary

Marine Conservation Zones

- 10.5.159 The Holderness Inshore Marine Conservation Zone (MCZ) is located north of the Humber mouth and encompasses Spurn Head. The site is designated for geological features, alongside benthic habitats:
- Intertidal sand and muddy sand.
 - Moderate circalittoral rock.
 - High energy circalittoral rock.
 - Subtidal coarse sediment.
 - Subtidal mixed sediment.
 - Subtidal sand.
 - Subtidal mud.
 - Spurn Head (subtidal).
- 10.5.160 Further detail on the MCZ is provided within Volume 3 - Appendix 7.3. Intertidal and Marine Technical Appendix and Chapter 7: Ecology and Biodiversity.

Intertidal Geological Composition and Features

- 10.5.161 The Southern North Sea (where the Easington Landfall is located) seabed is composed primarily of sand and muddy sand; coarser sediment and occasional bedrock outcrops are also present (Ref 10.59). Seabed features constitute sandbanks and sandwaves, shaped by hydrodynamic forces (Ref 10.60). Notable formations include the North Norfolk Sandbanks, which are gradually elongating northeast due to offshore sediment transport, and Dogger Bank, a stable sublittoral sandbank of glacial origin (Ref 10.61).
- 10.5.162 The Holderness coastline near Easington Landfall consists primarily of glacial till mixture of soft boulder clay, sand and gravel deposited during the Devensian glaciation (~18,000 years ago) (Ref 10.58). The coastline is rapidly eroding, and the erosion of such deposits contributes to the formation of the extensive sand and mudflats.
- 10.5.163 Coastal erosion is specifically prevalent within the Dimlington Cliffs SSSI. The 2025 intertidal survey further noted the presence of recent cliff retreat, with cliff deposits common across the shoreline. For further detail with respect to coastal erosion, please refer to Chapter 20: Coastal Processes.
- 10.5.164 Intertidal sediments at Easington Landfall consists of fine to medium sands, interspersed with gravel and clay reworked by tidal and wave action. Rippled sand dominates the lower shore, whilst coarser sediments are present in the mid / upper shore areas, as demonstrated in the 2022 and 2025 surveys.
- 10.5.165 Whilst preliminary results are only available for the 2025 survey at the time of writing, Particle Size Analysis (PSA) and Total Organic Carbon (TOC) analysis was undertaken for the 2022 survey. Further detail of these results is presented in Volume 3- Appendix 7.3: Intertidal and Marine Technical Appendix, however an outline is provided here also.
- 10.5.166 Sediment type (based on PSA) was largely discerned as largely consistent across the sampling location of the time, with sand being the predominant sediment type; sand content varied depending on shore height. TOC content was consistent with what would be expected of a moderately exposed, high-energy shoreline.

Offshore Survey

- 10.5.167 A geophysical survey was undertaken for the Offshore Environmental Statement (Ref 10.62). The survey area of which overlaps with the Study Area

for the Project, as a result the conclusions are deemed relevant for this PEIR and hence are presented alongside the intertidal survey conclusions.

- 10.5.168 The survey identified widespread gravel, pebble, cobble and boulder deposits in the nearshore areas. From the coastline to the nearshore (station KPS1) the seabed was characterised by cobble pavements interspersed with clay mounds and ridges up to 1.5 m high. Further offshore (stations KPS3 to KPS16), seabed ridges were found to trend northwest-southeast, reaching heights of up to 4 m. Extending offshore (beyond station KPS22) sandy sediments are seen to dominate, with Boulders Bank Formation exposing clay protrusions, alike clay platforms seen in the intertidal. The Project pipeline as a whole (including the offshore portion) intersects 17 seabed ridges, two of which fall within the Holderness Inshore MCZ (Ref 10.61).
- 10.5.169 PSA undertaken for the survey noted sediment type comprising of gravel, silt and clay in shallower waters, this transitions into a higher sand content further offshore. This is comparable to results of the 2022 Project survey, however higher sand content was concluded in the intertidal zone, with very little silt. Total Organic Matter (TOM) content was highest where the seabed was predominately noted as sand and muddy sand. 71% of the samples were noted as being organically enriched compared to regional background levels (per UKOOA, 2001). TOC concentrations were recorded to be higher in shallower waters, corresponding with the present composition of coarser sediments. Elevated Total Hydrocarbon Content (THC) content was also recorded in several of the nearshore stations of relevance to the Project. The highest concentration was 40.8 µg/g, though this was a documented outlier of the dataset. Several metal concentrations exceeded Cefas Action Levels and UKOOA percentiles at certain nearshore stations, specifically arsenic, cadmium, nickel and lead. These elevated concentrations correlate with higher TOC levels and are primarily associated with areas containing a higher proportion of fine sediments and mixed gravels (Ref 10.61).

Future Baseline

- 10.5.170 It is considered that with respect to Ground Conditions and Hydrogeology future baseline conditions are unlikely to be substantively different from those assessed with reference to current baseline.
- 10.5.171 Existing potential contaminative sources, which have been identified across the Project within Sections 1-3, are generally historical and are therefore not anticipated to change significantly and as such the ground conditions are not likely to change.

- 10.5.172 Consented development in brownfield / urban areas will need to obtain planning permission prior to commencement and could potentially result in localised remediation and improvement in land quality.
- 10.5.173 Changes to regional groundwater levels as a consequence of either climate change or sea level rise in the future are not likely to be significant. Regional changes to large scale public water supply and industrial groundwater abstraction (anthropogenic influence) have the potential to locally alter groundwater levels, spring flow, the risk of groundwater flooding and flow from blow wells. Consultation with the Environment Agency will be undertaken to understand any local areas where the future baseline is expected to change and any specific mitigation required.
- 10.5.174 Changes to groundwater quality in a future baseline scenario are not likely to be significant to the assessment. Any improvements to aquifer quality secured through WFD will not be jeopardised by the presence of the Project.
- 10.5.175 In summary it is considered that the 'future with development scenario' will be no different from the 'future baseline without development scenario' for hydrogeological receptors.
- 10.5.176 In relation to the intertidal geological receptor, this would largely be influenced by changes to erosion rates and beach profile lowering. Such future baseline scenarios are discussed within Chapter 20: Coastal Processes.

10.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 10.6.1 Where practicable, the Project has been designed to avoid nationally and regionally important geological and hydrogeological features or known or potential sources of contamination.
- 10.6.2 The main mitigation measure to prevent adverse effects on Ground Conditions and Hydrogeology receptors, during all phases of the development of the Project would be to make sure good site practice and management and adherence to a (CEMP). An outline CEMP will be submitted with the DCO application, and the CEMP will be secured through a requirement in the DCO and the Register of Commitments.

- 10.6.3 A review of available Desk Study information has identified potential sources of soil and / or groundwater contamination within the Study Area, and there may be a need for these areas to be investigated. As such a Ground Investigation (GI) may be required and a subsequent risk assessment of potentially contaminated sources, and their contaminant linkages undertaken to determine the potential risks posed to the Project.
- 10.6.4 An appropriate intrusive GI (if required) would be undertaken in accordance with all relevant guidance and legislation. Primarily BS 10175:2011(Ref 10.25) and the Environment Agency's Land Contamination Risk Assessment (LCRM) guidance (Ref 10.26).
- 10.6.5 The GI would be undertaken to achieve the following objectives:
- Determine the ground conditions to inform scheme design.
 - Assess the nature, extent and magnitude of contamination (if present).
 - Assess the risks (if any) from potential contaminants to Human Health and Controlled Waters receptors.
 - Assess the ground gas regime.
 - Determine groundwater levels.
- 10.6.6 If the Ground investigation and risk assessment identify areas of the Study Area that pose an unacceptable risk, then remedial measures targeting the potential contamination would be required. However, if it is not feasible to make suitable adjustments to the site, in extreme cases the design may need to be moved to an alternative route / routeing if possible.
- 10.6.7 A remediation strategy will be devised and discussed with the regulatory authorities (including relevant local authorities and the Environment Agency) prior to any remedial works. Contaminated material that is considered to pose a risk would be remediated in line with the agreed remediation strategy.
- 10.6.8 In areas where the trenchless crossing requires groundwater control in the form of groundwater abstraction (dewatering), a detailed hydrogeological assessment will be undertaken. Where groundwater control is required, a dewatering scheme will be developed prior to construction commencing (in engagement with the Environment Agency and appropriate public water abstraction companies) to demonstrate that there is an effective strategy to manage water arising from the operations and, where required, sufficient proposals to treat the water prior to controlled discharge. Any such assessment will consider the effects of any groundwater lowering or impacts on nearby abstractions or resources

- 10.6.9 For areas where the route intersects a SPZ1, an Operation Environmental Management Plan and a Foundations Work Risk Assessment will be undertaken. Consultation with the statutory water company will be made for public water supply abstraction SPZs.

Embedded Mitigation

- 10.6.10 Standard mitigation measures, comprising management activities and techniques, would be implemented during construction of the Project to limit effects through adherence to good site practices and achieving legal compliance.
- 10.6.11 The Register of Commitments (REAC) (Volume 4 – Appendix 4.2: REAC) contains relevant standard / good practice measures relating to Ground Conditions and Hydrogeology. Measures have been assigned references, for ease of cross-reference
- 10.6.12 Outlined below in Table 10-32 are the embedded mitigation measures identified for this PEIR.

Table 10-32 – Embedded Mitigation

Ref (GEO number)	Measure	Project phase	Responsible party
GEO 1	Site Investigation of potentially contaminated sites, with a subsequent risk assessment of the findings determining if remedial measures are required in areas of the Project. If required site specific remediation strategy prepared and implemented prior to installation of pipe.	Pre-construction / Construction	Design team
GEO 2	Adoption of appropriate investigation and construction methodologies when working in geologically, hydrogeological or ecologically sensitive areas (SSSIs, Ramsar site), if avoidance using route design is not possible	Pre-construction / Construction	Main Works Contractor
GEO 3	Adoption of appropriate pollution control measures when undertaking ground investigation and construction works to reduce the risks to identified receptors. No storage of chemicals or fuels within a SPZ1.	Pre-construction / Construction	Main Works Contractor
GEO 4	Routeing of pipeline to avoid hydrogeologically sensitive areas such within a SPZ1 of a public water supply well.	Design	Designer
GEO 5	Avoid disrupting shallow groundwater flow pathways with extensive underground infrastructure, which could create a barrier effect and potentially lead to groundwater flooding	Design	Designer
GEO 6	Avoid mixing waters between multiple aquifers, such as in deep open excavations, which could cause contamination of groundwater by mobilising shallow contamination.	Design	Designer
GEO 7	Pipeline to be installed beneath Dimlington Cliffs utilising trenchless methods to reduce the impact on the SSSI.	Construction	Main Works Contractor
GEO 8	Vibratory piling to be used over impact piling for the installation of the cofferdam	Construction	Main Works Contractor
GEO 9	Following pipeline installation, it will be buried using excavated material and the beach will be reinstated to pre-construction condition	Construction	Main Works Contractor
GEO 10	Material excavated for construction of the temporary access track through Dimlington Road will be stored, and subsequently reinstated following completion of Project construction	Construction	Main Works Contractor
GEO 11	Construction, operations, decommissioning and design of the pipeline will be in accordance with best practice guidance	Construction Operations Decommissioning	Main Works Contractor
GEO 12	The cofferdam and other associated infrastructure will be present for as short a time as reasonably practicable during construction	Construction	Main Works Contractor
GEO 13	Pipeline route optimisation in the nearshore will be conducted where reasonably practicable to minimise impacts on potential features of conservation interest	Construction	Main Works Contractor Applicant
GEO 14	Construction Environmental Management Plan (CEMP) will be prepared prior to the construction of the Project.	Construction	Main Works Contractor
GEO 15	Decommissioning Environmental Management Plan (DEMP) will be prepared prior to and implemented during the decommissioning phase of the Project.	Decommissioning	Main Works Contractor

Ref (GEO number)	Measure	Project phase	Responsible party
GEO 16	If imported material is needed or excavated material is re-used during the construction / backfilling of the pipeline, the material used is suitable for use and meets appropriate criteria with regards to contaminant levels.	Construction	Main Works Contractor

10.7 Preliminary Assessment of Potential Impacts

- 10.7.1 The preliminary likely significant effects of the Project have been assessed using current available data relating to both the construction, operation (and maintenance) and decommissioning phases. These are discussed below.

Construction

- 10.7.2 The potential impacts for Ground Conditions and Hydrogeology receptors across the entire route of the Project (sections 1-3), associated with the construction phase (before mitigation) are provided below in Table 10-33

Table 10-33 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change (before mitigation)	Duration of impact	Adverse / beneficial	Direct / indirect
Human Health: (nearby residents, public open space users and users of industrial / commercial properties within the Study Area, construction workers)	Depending on location of the risk Very High – Residential land use High – Public Open Space, Construction Workers Medium – Commercial / Industrial users	During construction and in particular during excavations, there is the potential for made ground / existing contaminants within the Study Area to be disturbed and mobilised which could impact human health.	Moderate	Temporary	Adverse	Direct
		During the construction of the pipeline, there is the potential to change the gas regime with the Study Area due to drilling into potential gas producing geologies, features or landfill sites.	Moderate	Temporary	Adverse	Direct
Geology – South Ferriby Chalk Pit SSSI	Very High	SSSI Boundary within the Study Area however no direct interaction between the project and the SSSI is anticipated. Migration of contaminants via groundwater is considered in the water receptors assessments.	Negligible	Temporary	Adverse	Indirect
Geology - Dimlington Cliffs SSSI	Very High	Engineering design works at the SSSI are not confirmed, however, for the purpose of this PEIR potential adverse impacts to this geological site could be caused by the construction works.	Moderate	Permanent	Adverse	Direct
Surface water features within Study Area – water quality	Depending on location of the risk	During construction and in particular during excavations, there is the potential for existing contaminants to become disturbed / mobilised and migrate into surface water features within the Study Area.	Moderate	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change (before mitigation)	Duration of impact	Adverse / beneficial	Direct / indirect
	Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses) Medium (Ponds)	Storage of construction materials / wastes in compounds areas and spillages of chemicals / fuels during construction could generate potentially contaminated run off which could impact surface water features.	Moderate	Temporary	Adverse	Direct
Groundwater features within Study Area – water quality	Depending on location of the risk Very High - Public water supply, Published SPZ1. GWDTE High – Principal Aquifers, SPZ2 Medium - licensed agricultural abstractions. Secondary A aquifer. Low – Secondary B or undifferentiated aquifer	During construction, there is the potential for existing contaminants to become disturbed / mobilised and migrate into groundwater features within the Study Area. Storage of construction materials / wastes in compounds areas and spillages of chemicals / fuels during construction could generate potentially contaminated run off which could impact groundwater features.	Major / Moderate	Temporary	Adverse	Direct
Groundwater features within Study Area – water quality	Very high – public water supply SPZ1	Below ground works causing turbidity in the groundwater that flows in a fracture dominated aquifer that feeds a public water supply well causing damage to the well and temporary loss of water supply.	Major	Short Term / Medium Term	Adverse	Direct
Groundwater features within the Study Area – groundwater levels and flows	Depending on location of the risk Very High - Public water supply, Published SPZ1. GWDTE High – Principal Aquifers, SPZ2 Medium - licensed agricultural abstractions	Groundwater control (dewatering) may cause drawdown and lowered water levels and consequently reduced flows at licensed abstractions or private water supplies.	Minor / Moderate	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change (before mitigation)	Duration of impact	Adverse / beneficial	Direct / indirect
Groundwater features within the Study Area – groundwater levels and flows	High – Spring flow supporting a Chalk river	Groundwater control (dewatering) may cause drawdown and reduced or temporarily cease spring flow, blow well flow and Chalk river flow.	Moderate	Temporary	Adverse	Indirect
Groundwater features within the Study Area – groundwater levels and flows	Depending on location of the risk Very High to High – GWDTE. Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses)	Groundwater control (dewatering) may cause drawdown which could cause reduced baseflow to groundwater supported watercourses or surface water at designated or non-designated sites or at a GWDTE.	Minor / Moderate	Temporary	Adverse	Indirect
Groundwater features within Study Area – water quality	Depending on location of the risk Very High to High -. GWDTE High – Principal Aquifers Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses)	Trenchless techniques creating a pathway for drilling fluids or other fluids used during construction to reach sensitive groundwater receptors or sensitive surface water receptors	Major / Moderate	Temporary	Adverse	Direct
Groundwater features within the Study Area – groundwater levels and flows	Depending on location of the risk Very high – public water supply High – Principal Aquifer	Trenchless techniques creating a pathway for artesian groundwater to escape, causing loss to water resources.	Minor / Moderate	Temporary	Adverse	Direct
Groundwater features within Study Area – water quality	Depending on location of the risk High – Principal Aquifer Very high – public water supply	Dewatering near the estuary or coast, or trenchless techniques creating a pathway for water to enter the aquifer; either potentially causing saline intrusion	Moderate / Minor	Temporary / Permanent	Adverse	Direct
Groundwater features within the Study Area – groundwater levels and flows	Medium – Private Water Supply	Pipeline trench intercepting land drains or conduits which form part of private water supply systems. Loss of supply.	Major / Moderate	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change (before mitigation)	Duration of impact	Adverse / beneficial	Direct / indirect
Groundwater features within Study Area – water quality	Depending on location of the risk Very high – public water supply SPZ1 High – SPZ1 for private water supply	The foundations of structures and the pipelines may provide a preferential pathway for contaminants to migrate to non-contaminated groundwater	Moderate / Minor	Medium Term	Adverse	Direct
Protected features in the Holderness Inshore MCZ	Medium	Temporary disturbance of seabed habitats / geological formations associated with the MCZ from construction activities.	Low	Temporary	Adverse	Direct

Operation

- 10.7.3 The potential impacts (before mitigation) for Ground Conditions and Hydrogeology associated with the operational phase are provided in Table 10-34.
- 10.7.4 It is assumed for the purposes of the PEIR that the pipeline will be buried to a sufficient depth such that impacts to human health from exposure to the pipeline are not expected. Human health receptors have therefore not been considered in the assessment below.

Table 10-34 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change (before mitigation)	Duration of impact	Adverse / beneficial	Direct / indirect
Surface water features within Study Area – water quality	Depending on location of risk Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses) Medium (Ponds)	The pipeline and associated structures may create a preferential pathway of existing and new contamination to mobilise and migrate into surface water and potentially groundwater within the Study Area. Leakage of contaminants from pipeline flow (liquid).	Moderate	Long Term	Adverse	Direct
Groundwater features within Study Area – water quality	Depending on location of the risk Very high – Public water supply, Published SPZ1, GWDTE High – Principal Aquifers, SPZ2 Medium - licensed agricultural abstractions. Secondary A aquifer.		Major - Minor	Long Term	Adverse	Direct
Groundwater features within Study Area – groundwater levels and flows	Depending on location of the risk Medium – Private Water Supply High – Spring flow supporting a Chalk river.	Permanent drainage or dewatering of groundwater due to the pipeline trench acting as a drain	Major to Minor	Long Term	Adverse	Indirect
Groundwater features within Study Area – groundwater levels and flows	Depending on location of the risk High to Negligible – land use	Underground structures may form a barrier to groundwater flow, which may cause local groundwater flooding upgradient and reduced groundwater flow downgradient	Medium / Minor	Long Term	Adverse	Direct
Groundwater features within Study Area – water quality	Depending on location of the risk	Thermal impacts arising from the pipeline which alter the temperature of groundwater	Minor to No Change	Short term (Seasonal) to Long Term	Adverse or Beneficial depending on water use	Direct (Aquifer) and Indirect (GWDTE)

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change (before mitigation)	Duration of impact	Adverse / beneficial	Direct / indirect
	Very High to Low – Principal to Secondary B or undifferentiated aquifer GWDTE – Very High to High					
Intertidal sensitive receptors	Medium	Thermal impacts arising from the pipeline which may alter intertidal sediment / water temperature profiles, potentially influencing sediment cohesion, moisture content, or erosion rates in the intertidal zone	Minor to No Change	Long Term	Adverse	Direct

Decommissioning

- 10.7.5 The potential impacts (before mitigation) for Ground Conditions and Hydrogeology receptors associated with the decommissioning phase are provided in Table 10-35.
- 10.7.6 It is understood that the pipeline will remain in place and that the decommissioning will involve the removal of the AGIs and Pump Facility. It is assumed for the purposes of the PEIR that dust (which may contain contaminants) generated during the decommissioning of these assets and could impact Human Health is covered in Chapter 6: Air Quality and therefore is not included in the table below.
- 10.7.7 No significant impacts to the intertidal receptors are foreseen based on the assumption the pipeline will remain in-situ post decommissioning.

Table 10-35 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change (before mitigation)	Duration of impact	Adverse / beneficial	Direct / indirect
Surface water features within Study Area – water quality	Depending on location of the risk Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses) Medium (Ponds)	Storage of decommissioning materials / wastes in compounds areas and spillages of chemicals / fuels during decommissioning could generate potentially contaminated run off which could impact surface water features and potentially groundwater within the Study Area.	Moderate to Minor	Temporary	Adverse	Direct
Groundwater features within Study Area – water quality	Very High - Principal Aquifer (regional use). SPZ1 (published) High – Principal Aquifer (local use) Medium -. Secondary A aquifer. Low – Secondary B or undifferentiated aquifer		Moderate to Minor	Temporary	Adverse	Direct
Groundwater features within Study Area – water quality	Very High - Public water supply, Published SPZ1. GWDTE Medium - licensed agricultural or industrial abstractions.	Retained pipeline becoming a future conduit of pollution due to deterioration and a future contamination incident, causing groundwater contamination.	Moderate to Minor	Short Term / Medium Term	Adverse	Direct
Geology - Dimlington Cliffs SSSI	Very High	Damage to SSSI during the decommissioning phase.	Moderate	Long Term	Adverse	Direct

10.8 Additional Mitigation and Enhancement Measures

- 10.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed previously within Section 10.7.
- 10.8.2 With regards to Ground Conditions and Hydrogeology, the main mitigation measure during the Construction phase is ensuring site team adherence to good working practices as outlined within the CEMP. The CEMP will outline the preferred techniques to help minimise the risk to the surrounding environment, including in terms of degradation of soil quality, and impacts to uncontaminated surface water, strata and groundwater resources.

Construction

Ground Conditions

- 10.8.3 From a ground conditions perspective, to mitigate potential contamination within the Study Area, the extent, magnitude and nature of potential contamination will need to be assessed through an appropriately design Ground Investigation, and subsequent risk assessments at the design stage.
- 10.8.4 It would be advised that additionally a watching brief be maintained during excavations as part of the construction works to confirm the presence / absence of potential contamination on-site. Potential contamination could be in the form of Made Ground or visual and olfactory evidence of contamination such as hydrocarbon staining / odours. If contamination is positively identified, the contaminated material would need to undergo appropriate sampling and chemical analysis to identify the form of contamination and its extent.
- 10.8.5 The results of sampling / chemical analysis should inform a risk assessment (in accordance with the appropriate guidance and legislation) to assess the potential risks to Human Health, Controlled Waters and infrastructure receptors.
- 10.8.6 On the basis of this risk assessment, if risks are unacceptable then appropriate remediation / remedial measures would be required to be undertaken.
- 10.8.7 A contamination discovery strategy would be devised prior to construction works commencing, with regulatory approval, to define the process of encountering unforeseen contamination to make sure it is dealt with in the correct manner.

- 10.8.8 The determination of risks through ground investigation, watching briefs, risk assessment and the potential remediation of areas of the site may result in the reduction of the significance, or even removal, of some of the potential effects identified.
- 10.8.9 Engineering design work for construction at the Dimlington Cliffs SSSI currently is considering four different options which would vary the impact on this geological receptor. Once the design is confirmed this will be discussed with Natural England and appropriate mitigation measures agreed to minimise the impact on the receptor. This will be detailed further in the ES.
- 10.8.10 The Project crosses the northern section of Winterton Landfill which is understood to be infilled, capped and restored. It also crosses the historical Eastfield Road landfill at the end of the spur near to South Killingholme. Depending on the depth of the pipeline in these areas, the pipeline may be within the waste deposits of the landfill. Engineering design will be considered in this area with the introduction of mitigation measures to reduce the risk of contamination from the landfill migrating into the wider environment. This would be considered during the construction and operation of the Project and further details will be included in the ES.

Hydrogeology

- 10.8.11 Ground investigation surveys will be undertaken to inform the design of the Project. During surveys, groundwater levels will be recorded and piezometers installed in boreholes at certain locations to allow groundwater levels to be monitored in order to get a record of level changes over a defined period to inform design.
- 10.8.12 A Hydrogeological Risk Assessment will be undertaken at each trenchless crossing locations which will inform areas where potential groundwater control is necessary. Consideration will be given to the potential effects of dewatering on adjacent water features both from drawdown during abstraction and secondary effects such as saline intrusion.
- 10.8.13 Where required a detailed dewatering scheme will be developed prior to construction (in engagement with the EA) to manage the water arising from dewatering operations prior to controlled discharge, including treatment if required; and from flood risk during discharge, and mitigation applied.
- 10.8.14 During the detailed design phase of the Project, investigations will be completed to identify all public water supplies and private water supplies that may be affected by the Project. A risk assessment shall assess whether these

water supplies may be impacted by construction activities or during operation. Selected water supplies will then be monitored before, during and after construction

- 10.8.15 For public water supplies, where possible, the pipeline route will be located outside of SPZ1s. Where this is not possible, detailed risk assessment, in consultation with the Environment Agency and the Statutory Water Company, will be conducted and mitigation measures provided to reduce disturbance of any existing contaminated soils, avoid removing existing surface protection and reduce the potential for leakage of contaminants.
- 10.8.16 A Groundwater Management Plan will be produced for the Project to protect sensitive water resources. This will be part of an overall Controlled Water Management Plan. The Groundwater Management Plan will include implications of dewatering requirements in terms of abstraction licensing, discharge management, and permitting. The implications it will address will include pressures on WFD water bodies, including those of poor quantitative or chemical status, and consider public water supply wells and principal aquifers along the route. Special provisions will be made for sections that may cross SPZ1s and for trenchless crossings requiring groundwater control. The plan will ensure regulatory compliance during construction, operation and decommissioning. Together with a Surface Water Management Plan, protection of controlled waters will be addressed and will include common measures to prevent contamination.
- 10.8.17 The construction of trenchless crossings will include good practice measures to prevent uncontrolled release of drilling fluid (frac-out) to the water environment. A Frac-Out Plan will outline procedures for preventing, containing, and cleaning up inadvertent fluid returns during drilling. The good practice measures will include a detailed risk assessment informed by targeted ground investigation as well as monitoring and management procedures for the drilling fluids.
- 10.8.18 The construction of the trenchless crossing beneath the River Humber will include specific measures to reduce water resource loss, i.e. potential loss of groundwater from the Principal aquifer. This will include provision of measures to deal with artesian groundwater if encountered during drilling (construction phase) and measures to seal or minimise long term potential pathways that would otherwise cause an adverse loss of groundwater from the Principal aquifer.
- 10.8.19 A qualitative risk assessment of potential thermal impacts of the pipeline to groundwater will be conducted, based on a hydrogeological conceptual site

model approach. From this the need for mitigation will be assessed and, if mitigation measures are needed, these will be determined in consultation with the EA.

- 10.8.20 Where piling / deep foundation are required a Foundation Works Risk Assessment will be completed using the appropriate guidance to reduce the migration impacts to the water environment from potential contaminants.

Intertidal

- 10.8.21 Prior to the commencement of works, agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal, to assess whether the beach has been returned to the pre-installation state.
- 10.8.22 A Beach Monitoring and Management Plan may also be agreed with the Local Authority and relevant consultees, as required. This Plan would detail the reinstatement of the beach to pre-construction condition, as far as reasonably practicable.

Operation

- 10.8.23 The majority of potential impacts within the operational phase are mitigated through design during construction. There is however a potential impact to sensitive water receptors and Dimlington Cliffs SSSI via the potential leaks from the pipeline which allow contaminants to escape and migrate into the wider environment. To reduce this impact a Monitoring and Maintenance plan should be put in place to investigate reductions in pressure along the pipeline and appropriate repairs undertaken to mitigate the impact on these receptors.

Decommissioning

- 10.8.24 It is assumed the pipelines would be left in-situ and therefore the decommissioning would include the removal of temporary works compounds and Above Ground Infrastructure.
- 10.8.25 It is assumed that the pipelines would be sealed and / or infilled permanently using materials and methods suitable for use in a water environment and / or as agreed by the EA.

10.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 10.9.1 Table 10-36 below summarises the preliminary assessment of potential significant effects (after mitigation) associated with the Project.

Table 10-36 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Human Health: (nearby residents, public open space users and users of industrial / commercial properties within the Study Area, construction workers)	Depending on location of the risk Very High – Residential land use High – Public Open Space, Construction Workers Medium – Commercial / Industrial users	Construction	During construction and in particular during excavations, there is the potential for made ground / existing contaminants within the Study Area to be disturbed and mobilised which could impact human health. During the construction of the pipeline, there is the potential to change the gas regime with the Study Area due to drilling into potential gas producing geologies, features or landfill sites.	Short to medium Term	Embedded mitigation: GEO 1 GEO 2 GEO 3 GEO 14 GEO 16	Slight
Groundwater features within Study Area – water quality	Very High - SPZ1 (published), Public water supply. Very High or High - Principal aquifer. Medium – Secondary A and licensed agricultural; abstractions private water supplies, Low - Secondary B and Secondary Undifferentiated	Construction	During construction, there is the potential for existing contaminants to become disturbed / mobilised and migrate into groundwater features within the Study Area. Storage of construction materials / wastes in compounds areas and spillages of chemicals / fuels during construction could generate potentially contaminated run off which could impact groundwater features. For the SPZ1 this could require temporary stoppage of a public water supply.	Short to Medium Term	Embedded mitigation: GEO 1 GEO 2 GEO 3 GEO 4 GEO 14 GEO16	Slight or Moderate
Surface water features within Study Area – water quality	Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses) Medium (Ponds)	Construction	During construction and in particular during excavations, there is the potential for existing contaminants to become disturbed / mobilised and migrate into surface water features within the Study Area. Storage of construction materials / wastes in compounds areas and spillages of chemicals / fuels during construction could generate potentially contaminated run off which could impact surface water features.	Short to Medium Term	Embedded mitigation: GEO 1 GEO 2 GEO 3 GEO 14 GEO16	Slight or Neutral
Groundwater features within Study Area – water quality	Very High - SPZ1 (published), Public water supply.	Construction	Pipeline construction using opencut trench methods providing a preferential pathway for construction related contamination	Short term / medium term	Embedded mitigation: GEO 2 GEO 3	Slight or Moderate

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
	Very High or High - Principal aquifer. Medium – Secondary A and licensed agricultural; abstractions private water supplies, Low - Secondary B and Secondary Undifferentiated				GEO 4 GEO 14	
Groundwater features within Study Area – water quality	Very High – SPZ1 of public supply well	Construction	Below ground works causing turbidity in the groundwater that flows in a fracture dominated aquifer that feeds a public water supply well causing damage to the well and temporary loss of water supply.	Short Term / Medium Term	GEO 14 Additional mitigation including consultation with Water Company and Environment Agency Foundations Risk Assessment.	Slight to Moderate
Groundwater features and connected surface water features within Study Area – water quality	Very High to Medium	Construction	Trenchless crossings methods creating a pathway for drilling fluids or other fluids used during construction to reach sensitive groundwater receptors or sensitive surface water receptors	Temporary	Embedded mitigation GEO 14 Additional mitigation including a Frac-out plan.	Slight to Moderate
Groundwater features within Study Area – water quality	Very High – Principal and public water supply	Construction	Saline intrusion of aquifer caused by groundwater control (dewatering) causing lowered groundwater levels at the coastline of estuary or creation of pathways for saline water to enter the aquifer	Temporary / Permanent	Embedded mitigation GEO 14 Additional mitigation including a Hydrogeological Risk Assessment	Slight to Moderate
Groundwater features within the Study Area – groundwater levels and flows	Very High - Principal aquifer (Chalk aquifer near River Humber	Construction	Loss of water resource by trenchless method beneath the River Humber causing a temporary conduit for groundwater to be lost from the Chalk aquifer, especially where there is artesian water.	Temporary	Embedded mitigation GEO 14 Additional mitigation including specific measures to reduce potential resource loss	Slight
Groundwater features and connected surface water features within the Study Area – groundwater levels and flows	Very High to Medium	Construction	Groundwater control (dewatering) at the open cut trenches or trenchless method crossings causing groundwater lowering and loss of supply at nearby groundwater abstraction wells, reduced flow at springs, blow wells, and Chalk rivers, or reduced flow to groundwater supported	Temporary	Embedded mitigation GEO 14 Additional mitigation including a Hydrogeological Risk Assessment for each Trenchless Crossing	Slight to Moderate

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
			features such as baseflow to watercourses, designated or non-designated surface water features and any GWDTEs.			
Groundwater features within the Study Area – groundwater levels and flows	Medium	Construction	Pipeline trench intercepting land drains or conduits which form part of private water supply systems. Loss of supply.	Short Term / Medium Term	Embedded mitigation GEO 14	Neutral to Slight
Groundwater features within Study Area – water quality	SPZ1 – public supply well	Operation / Decommissioning	Contamination related potential impacts comprising pipeline leakage of fluid contaminant or accidental release of contaminants as part of operation or decommissioning of pipeline and infrastructure	Short Term / Medium Term	Embedded mitigation GEO 11 GEO 15 Additional mitigation including a risk assessment of water supplies. Consultation with Water Company and Environment Agency. Monitoring and Maintenance Plan	Neutral to Moderate
Surface water features within Study Area – water quality	Depending on location of risk Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses) Medium (Ponds)	Operation	The pipeline and associated structures may create a preferential pathway of existing and new contamination to mobilise and migrate into surface water and potentially groundwater within the Study Area. Leakage of contaminants from pipeline flow (liquid).	Long Term	Embedded mitigation GEO 11 Additional mitigation including specific measures to reduce potential resource loss	Slight
Groundwater features within Study Area – water quality	Depending on location of the risk Very high – Public water supply, Published SPZ1. GWDTE High – Principal Aquifers, SPZ2 Medium - licensed agricultural abstractions. Secondary A aquifer.					

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Groundwater features within Study Area – groundwater levels and flows	Principal aquifer (Chalk aquifer beneath the River Humber)	Operation	Loss of water resource by trenchless method beneath the River Humber creating a permanent conduit for Chalk aquifer groundwater to be lost	Long term	Additional mitigation including specific measures to reduce resource loss	Slight
Groundwater features within Study Area – groundwater levels and flows	Depending on location of the risk High to Negligible – land use	Operation	Groundwater flooding risk increased by extensive below ground structures that cause a barrier to groundwater flow	Long Term	GEO 5	Neutral or Slight
Groundwater features within Study Area – groundwater levels and flows	Medium – Private Water Supply High – Spring flow supporting a Chalk river.	Operation	Permanent drainage or dewatering of groundwater due to the pipeline trench acting as a drain	Long Term	GEO 13 Additional mitigation including a risk assessment of water supplies.	Neutral or Slight
Groundwater features within Study Area – water quality	Very High to Low	Operation	Thermal impacts arising from the pipeline which alter the temperature of groundwater	Long Term	Additional mitigation including a Hydro-geological CSM	Neutral or Slight
Groundwater features within Study Area – water quality	SPZ1 – public supply well	Decommissioning	Retained pipeline becoming a future conduit of pollution due to deterioration and a future contamination incident, causing groundwater contamination.	Short Term / Medium Term	GEO 13 Additional mitigation including a risk assessment of water supplies. Consultation with Water Company and Environment Agency	Neutral to Moderate
Surface water features within Study Area – water quality	Depending on location of the risk Very High (main rivers and coastal waters) High / Medium (Ordinary watercourses) Medium (Ponds)	Decommissioning	Storage of decommissioning materials / wastes in compounds areas and spillages of chemicals / fuels during decommissioning could generate potentially contaminated run off which could impact surface water features and potentially groundwater within the Study Area.	Short Term / Medium Term	GEO 15	Slight to Moderate
Groundwater features within Study Area – water quality	Very High - Principal Aquifer (regional use). SPZ1 (published) High – Principal Aquifer (local use)					

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
	Medium -. Secondary A aquifer. Low – Secondary B or undifferentiated aquifer					
Dimlington Cliffs SSSI	Very High	Construction / Decommissioning	Disturbance / potential partial loss of geological SSSIs	Permanent	Embedded mitigation GEO 7 GEO 11 GEO 14 GEO 15 Additional mitigation including specific measures to reduce resource loss Pipeline to be installed beneath Dimlington Cliffs utilising trenchless methods Beach monitoring Ongoing monitoring of cliff retreat and coastal erosion rates following construction Agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal zone	Moderate
Geology – South Ferriby Chalk Pit SSSI	Very High	Construction	SSSI Boundary within the Study Area however no direct interaction between the project and the SSSI is anticipated. Migration of contaminants via groundwater is considered in the water receptors assessments.	Temporary	Embedded mitigation GEO 1 GEO 2 GEO 3 GEO 14	Neutral / Slight
Groundwater features within Study Area – water quality	Depending on location of the risk Very High - Public water supply, Published SPZ1. GWDTE	Construction	The foundations of structures and the pipelines may provide a preferential pathway for contaminants to migrate to non-contaminated groundwater	Medium Term	Embedded mitigation GEO 1 GEO 2 Additional mitigation	Slight

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
	High – Principal Aquifers, SPZ2 Medium - licensed agricultural abstractions. Secondary A aquifer. Low – Secondary B or undifferentiated aquifer				Foundation Works Risk Assessment	
Disturbance of protected features within the Holderness Inshore MCZ	Medium	Construction	Temporary disturbance of seabed habitats and geological features from construction activities Localised habitat loss within the MCZ.	Short-term	Embedded mitigation GEO 11 Pipeline route optimisation in the nearshore will be conducted where reasonable practicable to minimise impacts on potential features of conservation interest Vibratory piling to be used over impact piling for the installation of the cofferdam CEMP developed and adhered to. Agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal	Moderate
Thermal impacts arising from the pipeline being pressurised with dense-phase CO ₂	This will be determined once potential thermal impacts have been identified.	Operation	Heat transfer from the pressurised pipeline to surrounding sediments may alter sediment temperature profiles, potentially influencing sediment cohesion, moisture content, or erosion rates in the intertidal zone	Long-term	To be determined and presented within the ES.	To be assessed and the results presented at the ES.

10.10 Next Steps

Design Development

- 10.10.1 Currently there are four potential design options for construction work which could impact Dimlington Cliffs SSSI. Once the design is further progressed, the options will be discussed with Natural England to include appropriate mitigation measures within the ES to minimise the impact to this receptor.
- 10.10.2 The draft Order Limits currently intersect with Winterton Landfill and the historical Eastfield Road landfill at the end of the spur near to South Killingholme. Therefore, the pipeline could be placed within waste deposits depending on the depth of the pipeline at these locations. Further design and mitigation measures will be required to reduce the impact during the construction and the operational phase of the Project. Discussion will be sought with the appropriate stakeholders such as the EA, FCC Environmental (landfill operator) and local authority. Further details will be included within the ES.
- 10.10.3 The Project currently includes sections of the pipeline crossing some published SPZ1s. Depending on the existing ground conditions, further design and mitigation measures will be required to reduce the impact during the construction and the operational phase of the Project. Discussion will be sought with the EA and the water companies.
- 10.10.4 Where data requests have not been received in time for the PEIR, these responses will be incorporated into the ES, and further clarification from these parties will be sought if required. Current data requests include information sought from the Environment Agency about licensed groundwater abstractions, derogated abstractions, and groundwater levels.
- 10.10.5 Review of available information from local geological groups e.g. Hull Geological Society, local authorities and the GCR to establish if there are other potential geological receptors that need to be considered.
- 10.10.6 Further consultation with the Environment Agency and Natural England will be made to obtain more baseline information and discuss the design of particular elements of the design as detailed above. This will include consultation about the GWDTE status of the Humber Estuary so that necessary protections are included in mitigation measures. Separately consultation with the Environment Agency will be made about future abstraction licence strategy so that any

predicted future groundwater level changes, especially in the Chalk aquifer west of the River Humber, are used to inform the design.

- 10.10.7 Currently a review of historical mapping has not yet been undertaken. A review of historical mapping will be undertaken to establish if there are other areas of concern that should be investigated further. A Preliminary Risk Assessment in line with LCRM guidance will be undertaken and reported in the ES. This will further inform the design of the Project and the requirement for intrusive ground investigations to inform ground conditions and potential remedial measures.

Surveys

- 10.10.8 Hydrogeology walkovers will be completed prior to the authoring of the ES.
- 10.10.9 An intertidal Phase 1 walkover survey and Phase 2 site survey were undertaken at Easington Landfall in April 2025. Finalised contaminant and infaunal analysis will be presented in the ES.

Further Assessment

- 10.10.10 As part of the further assessment to be undertaken, the baseline conditions will be reviewed and refined based on the proposed detailed design of the pipelines and AGIs, along with other supporting information. This will help to provide a more detailed assessment of the potential impacts of the Project within the ES.
- 10.10.11 All current private abstractions that are used for drinking water (or bottled water) should have source protection zones applied. Therefore, as part of further assessment and in consultation with the Environment Agency, SPZs will be determined for potable private water supplies from groundwater or springs. The locations will be identified by the risk assessment outlined in the above Additional Mitigation and Enhancement Measures section.
- 10.10.12 An assessment of thermal impacts to groundwater will be conducted and reported in the ES. This will comprise a qualitative risk assessment of potential thermal impacts of the pipeline to groundwater, based on a hydrogeological conceptual site model approach.

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- Ref 10.53 Environment Agency (2025). *Groundwater Dependent Terrestrial Ecosystems (England only)*. Available at: <https://www.data.gov.uk/dataset/72a149a2-1be7-441f-bc37-94a77f261e27/groundwater-dependent-terrestrial-ecosystems-england-only>
- Ref 10.54 Department for Environment Food and Rural Affairs (2025), *Wharfe & Lower Ouse Sherwood Sandstone Water Body*, Available at: [Wharfe & Lower Ouse Sherwood Sandstone | Catchment Data Explorer | Catchment Data Explorer](#)
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- Ref 10.56 Environment Agency (2025), *Project Groundwater (Greater Lincolnshire)*, Available at: [Project Groundwater \(Greater Lincolnshire\) | Engage Environment Agency](#)
- Ref 10.57 Department for Environment Food and Rural Affairs (2025), *North Lincolnshire Chalk Unit Water Body*, Available at: [North Lincolnshire Chalk Unit | Catchment Data Explorer | Catchment Data Explorer](#)
- Ref 10.58 <https://urbanrim.org.uk/cache/East-Riding-Coastline-Past-Present-Future.pdf>
- Ref 10.59 Department of Trade and Industry (2001) Strategic Environmental Assessment of the Mature Areas of the Offshore North Sea. SEA 2 September 2001. Department of Trade and Industry.
- Ref 10.60 Department for Energy and Climate Change (DECC) (2016) UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3).
- Ref 10.61 Northern Endurance Partnership (NEP) (2023) Offshore Environmental Statement for the Northern Endurance Partnership Available at:

<https://assets.publishing.service.gov.uk/media/651eba807309a1000db0a8d7/>

- Ref 10.62 Gardline (2022a) 2021 Environmental Baseline Report
- Ref 10.63 National Grid. (2024). Eastern Green Link 3 and Eastern Green Link 4 Environmental Impact Assessment Scoping Report.

11 Cultural Heritage

11.1 Introduction

- 11.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Cultural Heritage. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 11.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Cultural Heritage effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 11.1.3 This chapter should be read in conjunction with:
- Chapter 10: Ground Conditions and Hydrogeology for an understanding of a potential change in hydrogeology from the Project, which may result in an indirect impact to waterlogged deposits with archaeological potential during the operation of the Project.
 - Chapter 12: Landscape and Visual for an understanding of the development of the Zone of Theoretical Visibility (ZTV) used in the heritage assessment and landscape viewpoints which this chapter also leans on.
 - Chapter 13: Noise and Vibration for an understanding of potential impacts to built heritage during construction and provide justification for the continued scoping out of physical impacts to built heritage.
 - Chapter 14 Socio-economics, Recreation and Tourism for interactions with some heritage assets.
 - Chapter 19: Major Accidents and Disasters due to potential interactions from Major Accidents and Disasters.
- 11.1.4 This chapter is supported by the following figures see Volume 3:
- Figure 11.1: Cultural Heritage Study Area
 - Figure 11.2: Designated Heritage Assets
 - Figure 11.3: Non-Designated Heritage Assets
 - Figure 11.4: Project Identified Assets
 - Figure 11.5: Historic Landscape Characterisation

- 11.1.5 This chapter is supported by the following appendices see Volume 4:
- Appendix 11.1: Detailed Cultural Heritage Assessment Methodology.
 - Appendix 11.2: Geoarchaeology Desk Based Assessment.
 - Appendix 11.3: Geophysics Survey Report (Phase 1).
 - Appendix 11.4: Inter-tidal Heritage Desk Based Assessment.
 - Appendix 11.5: Cultural Heritage Impact Assessments.

11.2 Legislation, Policy and Guidance

Legislation

- 11.2.1 Legislation relevant to Cultural Heritage is detailed in Table 11-1.

Table 11-1 – Summary of Legislation relevant to Cultural Heritage

Legislation	How it is considered within this PEIR
Ancient Monuments and Archaeological Areas Act 1979 (Ref 11.1)	The impact of the Project on Scheduled Monuments and their settings will be considered and used to guide decision-makers on mitigating potential impact and changes to heritage asset significance.
Planning (Listed buildings and Conservation Areas) Act 1990 (Ref 11.2)	The impact on heritage assets of special architectural or historic interest and their setting will be considered and used to guide decision-makers on mitigating potential impact and changes to heritage asset significance.

Policy

National Planning Policy

11.2.2 National Planning Policy relevant to Cultural Heritage is detailed in Table 11-2.

Table 11-2 – Summary of National Planning Policy relevant to Cultural Heritage

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Overarching National Policy Statement for Energy (EN-1) (Ref 11.3)		
5.9.11	The assessment of the historic environment is addressed under section 5.9 of EN-1. Section 5.9 discusses the need for an applicant to provide an understanding of the extent of impact of a proposed development on the significance of any heritage assets affected: ‘Where a site on which development is proposed includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, accurate representative visualisations may be necessary to explain the impact.’	A heritage baseline report for this Project will be prepared, which will demonstrate the consideration of heritage assets located within a Study Area buffered 500m from the draft Order Limits. This report will include the results of a Walkover Survey as a part of the assessment and will accompany the ES. Additionally, a program of geophysical survey, and geoarchaeological fieldwork has been commissioned, with discussions ongoing for the procurement of archaeological trial trenching, the results of which will be presented in the ES.
5.9.24	Paragraph 5.9.24 states ‘In considering the impact of a proposed development on any heritage assets, the Secretary of State should consider the particular nature of the significance of the heritage assets and the value	A heritage baseline report for this Project is being prepared which will include a baseline understanding of the value and significance of heritage assets located within a Study Area buffered 500m from the draft Order Limits. and will

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between their conservation and any aspects of the proposal.'	accompany the ES. This can be used as a guide to decision-makers to determine the heritage asset value of ensure their continued conservation.
5.9.30	Paragraph 5.9.30 states 'Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments; registered battlefields; grade I and II* listed buildings; grade I and II* registered parks and gardens; and World Heritage Sites, should be wholly exceptional.'	Section 11.5 of this chapter demonstrates the mitigation of removal or harm to designated assets through design considerations. Appendix 11.5 and Table 11-19 considers the changes to the setting of affected designated assets. The design assessed through the PEIR has sought to remove the assets from the draft Order Limits, to mitigate harm or loss.
Overarching National Policy Statement for Energy (EN-4) (Ref 11.4)		
2.12.13	There is no specific section on the historic environment in EN-4.	The only reference to the potential to impact heritage assets in EN-4 is through the action of dredging. This principally relates to the marine environment, which is scoped out of assessment and therefore, not considered further.
National Planning Policy Framework (NPPF) (Ref 11.5)		
207.	This paragraph states the requirement of consulting historic environment records to describe the significance of affected sites combined with a desk-based assessment where a proposal contains a heritage asset	A heritage baseline report for this Project is being prepared which will include a baseline understanding of the value and significance of heritage assets within the 500m Study Area of the draft Order Limits. The baseline report will

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	or site. <i>'As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.'</i>	contain numerous sources of heritage data, including historic environment records, and is further informed by the walkover survey. This considers the significance of heritage assets and the contribution made by their setting. Additionally, a program of geophysical survey, and geoarchaeological fieldwork has been commissioned, with discussions on going for the procurement of archaeological trial trenching. The results of which will be presented in the ES, alongside the baseline report.
208.	Paragraph 208 states <i>'Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this into account when considering the impact of a proposal on a heritage asset, to avoid or minimise any conflict between the heritage asset's conservation and any aspect of the proposal.'</i>	The responses of local and national authorities to the Environmental Impact Assessment Scoping Report were collected and are presented in Section 11.3 and will be reflected in Section 11.5.
212 – 217	These paragraphs describe the course of action a proposal is required to evidence in the event of any potential harm to designated and non-designated heritage assets.	The significance of designated and non-designated heritage assets and their settings will be considered in relation to the benefits and impacts of the Project, with a view taken on whether the negative impacts constitute

Planning Policy Reference	Policy Context	How it is considered within this PEIR
		substantial harm or not on heritage assets. The design, assessed within the PEIR has sought to remove the assets from the draft Order Limits, to mitigate harm or loss.

Local Planning Policy

11.2.3 Local Planning Policies relevant to Cultural Heritage are detailed in Table 11-3.

Table 11-3 – Summary of Local Planning Policy relevant to Cultural Heritage

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby District Local Plan, 2005 (Ref 11.6)	ENV15, ENV16, ENV22, ENV25, ENV27, ENV28	The plan includes numerous policies on the historic environment, principally focused on the need to preserve and or enhance the character of different heritage assets as part of future developments. These include policies focused on the historic character of landscapes (ENV15); historic parks and gardens (ENV16); Listed Buildings (ENV22); Conservation Areas (ENV25); setting of Scheduled Monuments (ENV27); and the need for archaeological assessment / evaluation where development proposals affect sites of known or possible archaeological interest (ENV28).	An overview of the current baseline understanding, considering the significance of heritage assets outlined in policy is presented in section 11.5. Potential impacts to these heritage assets are then considered in section 11.6 onward of this chapter, and in Appendix 11.5 As next steps, a full heritage baseline report for this Project is being prepared which will demonstrate the consideration of heritage assets within the 500m Study Area of the draft Order Limits. The Project has also commissioned a Walkover Survey as a part of the assessment, which will also be presented in the baseline report, which will form an appendix of the ES. Additionally, a program of geophysical survey, and geoarchaeological fieldwork has been commissioned, with discussions ongoing for the procurement of archaeological trial trenching, the results of which will be presented in the ES. The significance of designated and non-designated heritage assets and their settings will be considered to inform the judgement of benefits and impacts of the Project, as well as whether negative impacts are of substantial harm or not to heritage assets.
Selby District Core Strategy Local Plan, 2013 (Ref 11.7)	SP18	Policy SP18 Protecting and enhancing the environment, discusses heritage in respect of the need to conserve historic assets which contribute most to the distinct character of the district.	The significance of designated and non-designated heritage assets and their settings will be considered to inform the judgement of benefits and impacts of the Project, as well as whether negative impacts are of substantial harm or not to heritage assets. A full impact assessment is presented in Appendix 11.5.
East Riding of Yorkshire Local Plan Update, 2025 (Ref 11.8)	ENV3	Policy ENV3 ‘Valuing our heritage’ emphasizes the conservation and appropriate use of heritage assets to maintain the area’s historic character and support its economic wellbeing. “Wherever possible, developments affecting archaeological assets or their setting should be located or designed to avoid archaeological remains and ensure that these remains are preserved in situ. Considerable weight will be given to the preservation, protection, and enhancement of the asset. The more significant the remains, the greater the presumption will be in favour of this.” “Where the significance of archaeological remains is such that their preservation in situ is not essential and not feasible, the developer will need to set out those measures required to provide for the appropriate and satisfactory excavation and recording of the remains before planning permission is granted. A programme of archaeological investigation aimed at achieving preservation by record will be required to be submitted to and agreed with the local planning authority. The	Routeing and siting for the Project will seek to avoid and reduce, as far as practicable, effects on heritage receptors; with mitigation measures outlined in section 11.6 of this chapter. In the event re-routeing is not possible, mitigation via archaeological excavation and recording will be undertaken where appropriate for archaeological assets. The location of above ground infrastructure (AGIs), will receive suitable landscaping and planting to reduce potential impact. Other temporary impacts to setting during construction will be mitigated via an accompanying draft Construction Environmental Management Plan (CEMP), with most land returning to agricultural use following the carrying out of construction works. Further detail on mitigation is presented in Sections 11.5 and 11.7 of this chapter.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		findings should be published within an agreed timescale and submitted to the Humber Historic Environment Record.”	
Planning Obligations Draft Supplementary Planning Document (September 2025)	ENV3	Where a proposal is identified as having an impact on archaeological remains it must be recorded by an appropriately qualified professional consultant or contractor, and the resulting report must be placed on the authority’s Historic Environment Record. Developers are expected to meet any cost associated with these activities, including the potential analysis and publication of sites where significant remains have been recorded. Developers are required to adequately evaluate the impact that a development could have on the archaeological resource as part of their submission. A programme of archaeological assessment and evaluation work should be undertaken at the pre-application or pre-determination stage but in some instances, can be implemented via a planning condition attached to planning permission. Where appropriate, the contribution may include provision for the long-term maintenance of the heritage asset or the historic environment. When the archaeological potential of a site is understood, mitigation options will be explored to ensure preservation of the remains is achieved; this can take the form of either a programme of archaeological recording works, or by ensuring that the remains are protected in-situ. The recommended mitigation strategy will be secured via a planning condition. Every phase of archaeological work will take place in accordance with a written scheme of investigation, which has been approved by the Local Authority / Historic Environment Record. Each programme of archaeological work should be undertaken by a professional archaeological contractor / consultant, who will in turn conduct the work in accordance with professional industry standards, such as those issued by Historic England and the Chartered Institute for Archaeologists and any relevant local guidance.	This PEIR chapter considers impact to archaeological remains and provides details of further steps for a programme of archaeological works and outlined in further detail in Appendix 11.1. The PEIR chapter is also supported by specialist reports which represent the results of early phases of archaeological assessment. These include Geoarchaeology; (Appendix 11.2); Geophysics (Appendix 11.3); and inter-tidal (Appendix 11.4). All have been prepared by competent contractors, working under a written scheme of investigation, where appropriate. The understanding of impact to archaeological remains, identified in the PEIR chapter will be further refined for the ES. An outline mitigation strategy will be prepared to support the updated impact DCO application and will be informed by the results of future archaeological investigations.
North Lincolnshire Local Development Framework Core Strategy, 2011 (Ref 11.9)	CS6	Policy CS6 sets out that the council will look to protect, conserve and enhance North Lincolnshire’s historic environment, as well as the character and setting of acknowledged heritage assets of importance, including historic buildings, conservation areas, listed buildings (both	Routeing and siting for the Project will seek to avoid and reduce, as far as practicable, effects on heritage receptors, as outlined in section 11.6 of this chapter. The location of AGIs, will receive suitable landscaping and planting to reduce potential harm. Other temporary impacts to setting

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		statutory and locally listed), registered parks and gardens, scheduled ancient monuments and archaeological remains. It also states that new development must respect and enhance the local character and distinctiveness of the area in which it would be situated, particularly in areas with high heritage value. The policy also notes the safeguarding of the Isle of Axholme landscape.	during construction will be mitigated via an accompanying CEMP, with most land returning to agricultural use follow works. Further detail on mitigation is presented in Sections 11.5 and 11.7 of substantial harm or not on heritage assets.
North Lincolnshire Local Plan (May 2003) (Saved Policies (Updated October 2024)) (Ref 11.10)	HE8, HE9	Policy HE8 outlines that development proposals that adversely affect Scheduled Ancient Monuments or other nationally important monuments, including their settings, will not be permitted. Policy HE9 describes the requirement of an archaeological assessment of asset significance and potential impact. Sites of known archaeological importance will be protected, with a preference for preserving remains in situ. If not possible, developers must provide for excavation and recording before and during development.	Routeing and siting for the Project will seek to avoid and reduce, as far as practicable, effects on Scheduled Monuments. Scheduled Monuments have, where possible, been excluded from the draft Order Limits and the Project will seek to limit any changes in setting, where the setting of a Scheduled Monument is assessed to extend within the Project's draft Order Limits. The location of AGIs, will receive suitable landscaping and planting to reduce potential harm. Other temporary impacts to setting during construction will be mitigated via an accompanying CEMP, with most land returning to agricultural use follow works. Further detail on mitigation is presented in Sections 11.5 and 11.7 of this chapter.
North Lincolnshire Local Plan (May 2003) (Saved Policies (Updated October 2024)) (Ref 11.10)	HE5	Development affecting Listed Buildings- The council will seek to secure the preservation, restoration and continued use of buildings of special architectural or historic interest. Proposal which damages the setting of a listed building will be resisted.	Routeing and siting for the Project will seek to avoid and reduce, as far as practicable, effects on Listed Buildings. Listed Buildings have been excluded where possible, from the draft Order Limits and the Project will seek to limit any changes in setting, where the setting of a Listed Building is assessed to extend within the Project's draft Order Limits. The location of AGIs, will receive suitable landscaping and planting to reduce potential harm. Other temporary impacts to setting during construction will be mitigated via an accompanying CEMP, with most land returning to agricultural use follow works. Further detail on mitigation is presented in Sections 11.5 and 11.7 of this chapter.
North East Lincolnshire Local Plan (Ref 11.11)		Policy 39 highlights the requirement of future developments to protect, enhance and restore heritage assets and Conservation Areas. The policy emphasises that any planning determination which leads to harm to heritage assets, including any contribution made to their setting, must be informed by appropriate assessment.	The significance of designated and non-designated heritage assets and their settings will be considered to inform the judgement of benefits and impacts of the Project, as well as whether negative impacts are of substantial harm or not to heritage assets. The design has sought to remove the assets from the draft Order limits, to mitigate harm or loss.

Guidance

11.2.4 The Cultural Heritage assessment has been carried out in accordance with the following guidance:

- **Historic England 2008, Conservation Principles Policies and Guidance for the Sustainable Management of the Historic Environment** (Ref 11.12) - The document provides a framework to support quality decision-making and create a clear, transparent, and sustainable management regime. The document places particular focus on defined heritage values for heritage assets, which can be one or more of the following: evidential, historical, aesthetic or communal value.
- **Historic England 2015, Managing Significance in Decision Taking: Historic Environment Good Practice Advice in Planning Note 2 Environment** (Ref 11.13) - The planning note provides guidance for implementing the historic environment policy in the NPPF, including establishing the significance of heritage assets.
- **Historic England 2017, The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3** (Ref 11.14) - The setting of heritage assets provides guidance to practitioners, local authorities and planners in carrying out the assessment of setting of heritage assets. The guidance provides a five-step staged approach to proportionate decision-taking in respect of a heritage asset's setting. These include establishing the role setting plays to an asset's significance and assessing the effects of the Project on the setting.
- **Chartered Institute for Archaeologists (CIfA) 2022, Code of Conduct** (Ref 11.15) - The document outlines the general standard of conduct to which members and registered organisations of the Institute are expected to adhere.
- **Chartered Institute for Archaeologists (CIfA) 2021, Principles of Cultural Heritage Impact Assessment in the UK** (Ref 11.16) - The document provides guidance for Cultural Heritage practitioners for evaluating the consequences of change to heritage assets. It provides a language and framework for understanding and assessing these effects.
- **Chartered Institute for Archaeologists (CIfA) 2020, Standards and Guidance for Historic Environment DBA** (Ref 11.17) - The guidance identifies good practice for the execution and reporting of desk-based assessments, with the focal standard being the need to determine the nature, extent and significance of the historic environment within a specified area.
- **Chartered Institute for Archaeologists (CIfA) 2020, Standards and Guidance for Commissioning Work or Providing Consultancy Advice on Archaeology**

and the Historic Environment (Ref 11.18) - The document indicates the standard for providing professional advice regarding the historic environment to the commissioner of archaeological and other historic environment work, and ensuring it complies with ethical, legal, and policy requirements. It also identifies likely resource requirements.

- ICOMOS 2022, Guidance and Toolkit for Impact Assessment in a World Heritage context (Ref 11.19) - The document and toolkit provide guidance and a methodology for understanding and describing impacts to Cultural Heritage assets. It incorporates and builds upon the ICOMOS 2011 guidance and, although tailored to World Heritage Sites, it can be used for all types of heritage places with proposed development.
- ICOMOS 2011, Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (Ref 11.20) - The document offers guidance on the process of commissioning Heritage Impact Assessments for heritage assets to evaluate effectively the impact of potential development on the value of an asset. It also provides guidance on assigning grades of significance to heritage assets. Whilst it is tailored to World Heritage Sites, it can be used for all types of heritage places with proposed development.

11.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 11.3.1 A summary of relevant parts of the EIA Scoping Opinion from the Planning Inspectorate (PINS) (Ref 11.21) and our responses to this Scoping Opinion are outlined below in Table 11-4

Table 11-4 – Summary of Scoping Opinion relevant to Cultural Heritage

Section Reference	Matter	Comments	Response
3.7.1	Below-ground archaeology – operational phase	The Scoping Report states that no significant effects are anticipated on below-ground archaeology during operation as all impacts would have occurred during the construction phase. However, it confirms that potential impacts to below-ground archaeology caused by a change in hydrology will be considered. The Inspectorate is content with this approach.	Noted, the Cultural Heritage assessment will be supported by the hydrogeology assessment (Chapter 10: Ground Conditions and Hydrogeology). All information available will be used to develop the Cultural Heritage assessment for the ES.
3.7.2	Intertidal and marine archaeology at the Humber Estuary – construction and operational phases	The Scoping Report states that the locations of the entry and exit points of the Humber Estuary trenchless crossing would be a sufficient distance from the banks of the Humber Estuary to avoid impact to the riverbanks and archaeology that may be present at low or high tide. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES, however it welcomes that this would be scoped back in should design changes affect this assumption.	Noted.
3.7.3	Marine archaeology at Easington – construction and operational phases	Table 11-7 of the Scoping Report explains that any works in the marine environment beyond the Mean Low Water Springs (MLWS) mark, near Easington, would be assessed via the Northern Endurance Partnership (NEP) offshore application. It also states that the marine element will be considered as part of the cumulative assessment in the ES. Subject to the construction methodology setting launch and receiver pits out of the intertidal zone, the Inspectorate is content with this approach. However, the Inspectorate notes the potential for physical works within the intertidal zone depending on the final construction methodology (e.g. a sheet pile cofferdam as detailed in paragraph 3.6.58). The Scoping Report does not confirm whether there is the potential for marine archaeological assets to be present within the intertidal areas. As such, the Inspectorate does not consider that sufficient information has been provided at this stage to demonstrate that significant effects are unlikely. The ES should therefore provide an assessment of likely significant effects, or justification as to why a significant effect is unlikely to occur. This could include evidence that there is unlikely to be significant marine archaeological assets present or confirmation that construction measures can be secured which would avoid effects on marine archaeology.	An inter-tidal DBA for the Easington landfall location was prepared in August 2022 and an addendum to update the baseline conditions are planned as part of the Project's development. This will support the assessment of likely significant potential impacts as part of the ES.
3.7.4	Physical impacts to built heritage – construction and operational phases	Figure 11.1 of the ES demonstrates that no heritage structures are located within the current draft Order Limits. Provided the ES can confirm that no built structures are within the final draft Order Limits, the Inspectorate agrees that significant effects from direct physical impacts are unlikely and that this matter can be scoped out of the ES. The Inspectorate notes and	The potential for indirect physical effects from vibration is expected to be very limited, based on the proposed nature of the works.

Section Reference	Matter	Comments	Response
		welcomes that the Scoping Report confirms that should a survey reveal previously unrecorded built structures, this matter will be scoped back in. Notwithstanding the above, Figure 11.1 shows several heritage assets located in proximity to the draft Order Limits, or within 'cut-out' sections e.g. on page 1 of 7 near Drax. The ES should assess indirect physical effects to built heritage e.g. as a result of vibration, where significant effects are likely.	Chapter 13: Noise and Vibration should be read in conjunction with this chapter to support understanding and where relevant, information has been brought into this chapter to support the Cultural Heritage assessment.
3.7.5	All assets – decommissioning phase	The Inspectorate agrees that decommissioning is unlikely to result in significant effects to the cultural heritage resource. This on the basis that there would be no further physical impacts beyond those experienced during construction and that any impacts that arise during the decommissioning of AGIs and Pump Facility would be temporary during the process of returning the site to pre-commencement / baseline conditions. This matter can be scoped out of the ES.	Noted.
3.7.6	Non-Designated Heritage Asset	The applicant's attention is drawn to the comments of North Yorkshire Council in respect of the definition of Non-Designated Heritage Assets. This term should only be used for assets specifically identified by a plan making body as having a degree of significance, such as those on a local list or neighbourhood plan.	Heritage features identified by the desk-based assessment and commissioned fieldwork are clearly separated from Non-Designated assets in figures and terminology as 'Project Identified Assets'.
3.7.7	Significance of effects matrix	Table 11-5 indicates that two levels of significance are possible as a result of certain combinations of impact magnitude and receptor sensitivity. In these cases, the ES should clearly detail how the final level of significance has been determined and provide justification for not adopting the worst-case level of significance from the options available. Where professional judgement is used to determine whether an identified effect is significant or not significant, this decision should be supported by clear reasons and evidence and make reference to any relevant guidance.	Noted.
3.7.8	Study Area	The Scoping Report proposes a 500m Study Area, buffered from the draft Order Limits for both designated and non-designated assets. North Lincolnshire Council has advised a Study Area of 1km for designated heritage assets and their settings. The applicant is advised to seek to agree the Study Area with North Lincolnshire Council or provide a robust justification within the ES for the chosen Study Area.	A 500m Study Area is deemed proportionate to the anticipated impact of the proposed Project and allows for a sufficient understanding of potential further archaeological remains to be present within the draft Order Limits. For the majority of the route, the Project is primarily underground along a linear route, with AGIs visible above ground. This 500m Study Area has been established around the draft Order Limits which represents a wider corridor for baseline data collection than expected for assessment within the ES. In areas where AGIs are present, an additional Study Area of 500m from the ZTV analysis has been used to address possible setting impacts. As outlined in section 11.4.1 of this chapter, the 500m Study Area around AGIs will be extended to include the landscape zone of theoretical visibility

Section Reference	Matter	Comments	Response
			and aid understanding of potential setting impacts to designated heritage assets. These locations represent the primary visual impact from the Project and therefore, a proportionate response to assessing potential impact as a result of a change in setting, caused by the Project. Geophysical survey was undertaken between October 2022 and May 2023 for an alternative design proposal of a possible pipeline across the Humber region. The survey data has been turned into a full report on behalf of this Project and presented in Appendix 11.4. Some areas covered by the previous survey are no longer relevant to the development of this Project's heritage assessment. Only where there is cross over with the draft Order Limits and associated Study Area, have survey findings been considered within current assessment.
3.7.9	Survey Effort	The applicant is advised to seek to agree a proportionate survey effort with the relevant consultation bodies and demonstrate that it aligns with the relevant industry standards / guidance. The applicant's attention is drawn to North Lincolnshire Council in this respect.	The Project mobilised a further geophysical survey, which commenced from 24 March 2025 to gap fill areas of the draft Order Limits not covered by the previous survey. The WSI, outlining a methodology adhering to industry standards and guidance, was circulated with amongst LPA's Archaeological Officers. A phase of geoarchaeological led interventions have also been discussed with heritage consultees. A WSI, outlining a methodology adhering to industry standards and guidance, has been shared with Historic England and the LPA Archaeological Officers. The Project remains committed to discuss further archaeological fieldwork with the heritage consultees, as captured in Appendix 11.1 and table 11-5 / section 11.10 of this chapter.

Summary of Engagement

- 11.3.2 The engagement taken to date, and how it has been considered within the assessment process, is outlined in Table 11-5 below.

Table 11-5 – Summary of Stakeholder Engagement relevant to Cultural Heritage

Consultee	Date and method of engagement	Summary of Issues Raised	Response
Heritage Working Group including Historic England, Archaeological Advisors and Conservation Officers representing the Local Planning Authorities which the Project crosses.	07 November 2024 – online meeting	A summary introduction of the Project was provided including a high-level overview of expected development activities in each area alongside some potential initial key heritage impacts. A summary of the Proposed heritage approach to assessment was shared. Comments from consultees had the following key focus: • Need to go away and review proposals for potential significant impacts. • Need to progress survey, including reporting of previous survey efforts. • Consideration of social value opportunities.	Appendix 11.1 includes a detailed methodology breakdown of assessment to support the development of the Cultural Heritage impact assessment. The Project has shared Written Schemes of Investigation with consultees for some early survey efforts (see below) and Appendix 11.2 (Geoarchaeology) and Appendix 11.3 (Phase 1 Geophysics report) presents results of early phases of assessment. Social value remains under discussion and will be addressed further during the ES.
Historic England and the respective Archaeological Advisors	19 March 2025 - Email	A Written Scheme of Investigation for Geophysics Survey was shared with the archaeological advisors in the working group. Responses were welcoming of the proposal, including the use of a 180m corridor for data collection. Clarity of the justification for the scoping out of areas for survey was sought.	Survey efforts have commenced and are ongoing. A breakdown of the justification for scoping areas was presented during the subsequent working group.
Heritage Working Group including Historic England, Archaeological Advisors and Conservation Officers representing the Local Planning Authorities which the Project crosses.	03 April 2025- online meeting.	An update on the Project's progress and programme was provided. Responses to scoping comments were also provided for further discussion. An update was provided on survey effort for both geophysics and geoarchaeology. Geophysics included a run through of why areas were scoped out, in response to initial WSI feedback. Primary justification for scoping out was focused on completion of surveys by previous survey efforts which would not be repeated or the clipping of fields in the corridor limiting data collection opportunities.	Appendix 11.1 of the PEIR includes an overarching method statement for the heritage assessment to continue discussion of scope and address scoping comments.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		Geoarchaeology- initial scope shared and that the scope would be captured in a WSI to be shared for comment. Officers commented that the coverage of the geophysical survey looked good / comprehensive, but some concerns raised about the reliance of old reports 2-3 decades old, as a justification to scope out areas for survey. Confirmation that any WSI geoarchaeology will require review by the scientific advisors at Historic England as part of commenting.	
Archaeological advisors to North Lincolnshire and East Riding of Yorkshire.	July-August 2025- by email.	The Project shared project designs with the respective local authority archaeological advisors. The documents set out the scope for a small phase of trial trenching in proximity to the River Humber crossing, within the terrestrial environments. The proposed work is to help inform some early design work of the proposed crossing of the River Humber. The documents were followed up with WSIs from the appointed archaeological contractor for the onsite methodology.	East Riding of Yorkshire- Agreement of project design on 14 July 2025. WSI agreed: 08 August 2025. Fieldwork carried out between 18 and 22 August 2025. Report pending, at the time of writing. North Lincolnshire- Agreement of project design on 05 August 2025. WSI agreed: 22 August 2025. Fieldwork planning on going at the time of writing.

11.4 Assessment Methodology

Baseline Data

Study Area

- 11.4.1 The Project will principally use a Study Area extending to 500m from the draft Order Limits for both designated and non-designated heritage assets. For the majority of the route, the Project is primarily underground, with only AGIs and the Pump Facility visible above ground. AGIs are expected to have a maximum height of 4.5 m (see section 2.6 of Chapter 2: Project Description) and therefore, represent a relatively low height building in the landscape, similar to a field barn. For this reason, it is believed that 500 m will provide adequate information to understand the archaeological potential in the vicinity of the Project, while also characterising and contextualising the historic environment within the Project's wider environs.

Baseline Data Collection

Desk Study Sources

- 11.4.2 Baseline conditions of the Project were established during a desk study using the following sources:
- Historic Environment Record (HER) data for known archaeological sites, monuments, find spots and events
 - Data from the Historic England Archives (HEA) for known Cultural Heritage assets within the intertidal zone only.
 - Historic Landscape Character Information from the respective HERs.
 - Archaeological reports on archaeological interventions within the draft Order Limits and proposed AGI locations.
 - Published archaeological journals and monographs, local history books and pamphlets, including local history websites as appropriate.
 - Historic maps, including Ordnance Survey (OS), estate maps, enclosure maps, tithe maps and military plans, all available scales of OS maps will be utilised.
 - Available aerial photographs, including a Project commissioned Unmanned Aerial Vehicle (UAV) / drone aerial survey.
 - LiDAR data, processed from a digital terrain and digital surface models captured from the UAV survey.
 - Data sets of designations from Historic England's National Heritage List for England.

- Data from the Coastal and Intertidal Zone Archaeological Network (CITiZAN).
- UK Hydrographic Office (UKHO) reviews of cartography, historic charts and sailing directions.
- Relevant Strategic Environmental Assessment (SEA) reports (e.g. UK continental shelf SEA archaeological baseline) and coastal survey assessment reports.
- Data held by the European Marine Observation and Data Network (EMODnet) and the Marine Environment Data Information Network (MEDIN).
- OceanWise wrecks and obstructions database and data held within wrecksite.eu.
- Conservation areas have recently become available as a data download from Historic England. Data for conservation areas will be cross referenced with the local authority websites to ensure accurate data is used.

Site Visits and Surveys

- 11.4.3 A programme of targeted walkover surveys has been undertaken to increase the understanding of the baseline historic environment conditions. The targeted walkover survey has been supported by a Project commissioned UAV / drone aerial survey. The results of the walkover survey will be summarised in the forthcoming Cultural Heritage baseline report.
- 11.4.4 To accompany the desk-based assessment and further supplement the baseline, a program of geophysical survey and geoarchaeological led boreholes has been commissioned, with ongoing discussions for the procurement of archaeological trial trenching. The results of completed surveys will be presented in the ES.

Impact Assessment Methodology

Sensitivity

- 11.4.5 Based on the understanding of heritage assets, including their group context within the landscape, an assessment of value will be provided within the baseline study. Value will be provided for individual assets, not groups, but the value will account for the contribution the asset makes to the group and vice versa for the contextualisation of the asset in relation to others.
- 11.4.6 The value (heritage significance) of an asset will be derived from its ability to illustrate one or more of the heritage interests as outlined in NPPF, which are

artistic, architectural, historical and archaeological. The contribution of setting to the significance of a heritage asset will also be considered as part of the assessment of value within the baseline study.

- 11.4.7 Accounting for the value (heritage significance) of a heritage asset through its ability to demonstrate one or more heritage interests, the contribution of the asset's setting, and professional judgement, the criteria in Table 11-6 will be used for assigning value. This assessment has been undertaken using professional judgement, drawing upon sources of guidance including Historic England's (2008) Conservation Principles (Ref 11.12), specifically the individual values that contribute to an asset's significance. This is alongside further guidance including the ICOMOS (2022) Guidance and Toolkit (Ref 11.19).

Table 11-6 – Assigning Value Criteria

Value	Criteria for HCCP
Very High	World Heritage Sites (including nominated sites) inscribed for their cultural heritage importance. Assets that can contribute significantly to acknowledged international research objectives. Assets of acknowledged international importance.
High	Scheduled Monuments (including proposed sites) Grade I and II* Listed Buildings Grade I and II* Registered Parks and Gardens Registered Battlefields Protected Wrecks Conservation Areas containing buildings of predominantly high value. Non-designated assets of the quality and importance to be designated. Assets that can contribute significantly to acknowledged national research objectives.
Medium	Grade II listed buildings Grade II Registered Parks and Gardens Conservation Areas containing buildings of predominantly medium value. Assets that contribute to regional research objectives and / or have exceptional quality in their fabric or historical associations.

Value	Criteria for HCCP
Low	Locally listed buildings, or those of equivalent quality in their fabric or historical associations. Assets of local importance. Assets compromised by poor preservation and / or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives.
Negligible	Assets with very little or no surviving archaeological / historical interest Buildings of no architectural or historical note; buildings of an intrusive character
Unknown	The importance of the resource has not been ascertained / is inaccessible

Magnitude of Impact

- 11.4.8 Following the determination of the heritage value of an asset, the magnitude of impact of the Project on that significance (or the ability to appreciate it) is considered. Potential impacts could include direct impacts to the fabric of an asset, or changes to aspects of the setting of an asset, which contribute to the heritage value of that asset.
- 11.4.9 An assessment of the magnitude of impact is made using professional judgement guided by legislation, national policies, acknowledged standards, designations, criteria and research priorities, in particular ICOMOS (2011) Guidance on Heritage Impact Assessments (Ref 11.20), and the ClfA (2021) Principles of Cultural Heritage Impact Assessment (Ref 11.16). The magnitude of impact for the assessment is scored as high, medium, low, negligible, or no change, as outlined in Table 11-7.

Table 11-7 – Assigning Magnitude of impact criteria

Magnitude of Impact (term)	Criteria of impact
High	Change to most or all key archaeological materials, such that the resource is totally altered Comprehensive changes to setting of archaeology or built heritage.

Magnitude of Impact (term)	Criteria of impact
	Change to key historic building elements, such that the resource is totally altered
Medium	Changes to many key archaeological materials, such that the resource is clearly modified Considerable changes to setting that affect the character of the asset Change to many key historic building elements, such that the resource is significantly modified Changes to the setting of an historic building, such that it is significantly modified
Low	Changes to key archaeological materials, such that the asset is slightly altered Slight changes to setting Change to key historic building elements, such that the asset is slightly different Change to setting of an historic building, such that it is noticeably changed
Negligible	Very minor changes to archaeological materials, or setting Slight changes to historic building elements or setting that hardly affect it
No change	No change

Significance

- 11.4.10 The significance of effect is expressed as a result of the value of the heritage asset and the magnitude of impact it would experience as a result of the Project. The significance will be expressed as major, moderate, minor, negligible or neutral and can be adverse or beneficial. The matrix for reporting of significance of effect is outlined in Table 11-8, adapted from the ICOMOS, 2022 'Guidance and Toolkit for Impact Assessment in a World Heritage context' (Ref 11.19).
- 11.4.11 The matrix (Table 11-8) will be used as a check to ensure that judgements on value, magnitude of impact and significance of effect are balanced, but in all

cases professional judgement will be used and the value and impact judgements will be revisited if the significance of effect is unreasonable. In EIA terms a significant effect is a moderate or major effect.

Table 11-8 – Matrix for assigning Significance of Effect

		Value of Heritage Asset				
		Very High	High	Medium	Low	Negligible
Magnitude of impact	High	Major	Major	Major to moderate	Moderate to Minor	Minor
	Medium	Major to Moderate	Major to Moderate	Moderate	Minor	Negligible
	Low	Major to Moderate	Moderate to Minor	Minor	Negligible	Negligible
	Negligible	Minor	Minor	Negligible	Negligible	Neutral
	No Change	Neutral	Neutral	Neutral	Neutral	Neutral

Assumptions and Limitations

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

- Heritage data will be obtained from third-party sources which are assumed to be accurate. However, this information will be supplemented by archaeological walkover, archive research and a Project-commissioned UAV / drone survey and therefore is considered to present a robust basis for assessment.
- The archaeological record can contain evidence of varying reliability. Antiquarian excavations (excavations carried out prior to the establishment of modern scientific methods) were conducted to standards that differ from modern investigations. The results of these investigations can no longer exist.
- Due to the nature of archaeological remains, their identification and assessment necessarily requires an element of assumption. In particular, the nature, extent survival and even the precise location of buried

archaeological remains are often uncertain, as the majority of such sites have never been subject to archaeological investigations to modern standards.

- Assessment is based on the current information provided in Chapter 2: Project Description. The design of the Project will continue to be reviewed and assessed in advance of the DCO Application submission.
- The Project has reported on a geophysical survey completed between October 2022 and May 2023. The Project has also commenced with a programme of further geophysical survey in March 2025. The scope of the geophysical survey includes a survey area of 90m either side of the latest proposed Project centreline within the draft Order Limits. It will assess as much of this area where possible (accounting for seasonal conditions and land access discussions), for submission with the DCO.
- The assessment will not include any internal inspections or surveys inside of any Built Heritage assets or properties.

11.5 Baseline Conditions

11.5.1 The Proposed draft Order Limits have been divided into three geographic sections, for reporting purposes, as defined in the Chapter 2: Project Description:

- Section 1 – Drax to River Trent.
- Section 2 – North Lincolnshire, and
- Section 3 – the East Riding of Yorkshire

11.5.2 This structure is carried forward into the baseline. Section 1 covers assets from the Drax area in North Yorkshire at the western extent / start of the draft Order Limits and ends at the western border of the River Trent in North Lincolnshire. Section 2 begins at the eastern border of the River Trent and travels through North Lincolnshire, ending at the north bank of the River Humber. Lastly Section 3 discusses assets in the East Riding of Yorkshire from the north bank of the River Humber across the south of Holderness, terminating at Mean Low Water Springs off the coast at Easington.

Archaeological Assets

11.5.3 Archaeological remains include material remains of human activity from the earliest periods of human evolution to the present. These may be buried traces of human activities, sites visible above ground, or moveable artefacts. These included both designated (Scheduled Monuments) and non-designated remains.

Designated Archaeological Assets

- 11.5.4 There are 23 Scheduled Monuments (SMs), 138 Listed Buildings (LBs) and six Conservation Areas (CAs) located within the Study Area, these are presented on **Figure 11.2** Designated Heritage Assets. The following tables show the number of each type of designated heritage asset within the Study Area, split into Sections. A full breakdown of assets is available in Appendix 11.5.

Table 11-9 – Scheduled Monuments within the draft Order Limits and its Study Area

Designated Heritage Asset	Section	Within draft Order Limits	Within Study Area
Scheduled Monuments	Total	2	25
	Section 1	0	4
	Section 2	1 (East Halton Bombing Decoy; SM15)	14
	Section 3	1 (Paul Holme Moated Site (SM21)	5

Table 11-10 – Listed Buildings within the draft Order Limits and its Study Area

Designated Heritage Asset	Section	Within draft Order Limits	Within Study Area
Listed Buildings	Total	1	138
	Section 1	1 (Field House Farmhouse, Grade II, LB36).	42
	Section 2	0	65
	Section 3	0	31

Table 11-11 Number of Conservation Areas within the draft Order Limits and its Study Area

Designated Heritage Asset	Section	Within draft Order Limits	Within Study Area
Conservation Areas	Total	0	8
	Section 1	0	3

Designated Heritage Asset	Section	Within draft Order Limits	Within Study Area
	Section 2	0	1
	Section 3	0	4

Non-Designated Archaeological Assets

- 11.5.5 A full assessment of the value of non-designated archaeological assets are included in **Appendix 11.5** and their spatial locations presented on **Figure 11.3: Non-Designated Heritage Assets**. The following section provides a preliminary overview of the current baseline for the Project.

Baseline

Prehistoric

Palaeolithic Period

- 11.5.6 Archaeological evidence for Yorkshire and North Lincolnshire during the Prehistoric period is limited. The Historic Environment Record (HER) for the Study Area records a single find of Palaeolithic origin. The landscape and environment would have been highly impacted by several glacial and interglacial episodes which greatly affected human settlement in the region.
- 11.5.7 Evidence of hominid activity in the Lower and Middle Palaeolithic is extremely rare and largely confined to the south of the British Isles, which avoided the worst effects of glaciation. Yorkshire and North Lincolnshire were impacted by the Devensian Full Glacial phase from about 25,000 to 16,000 years ago (ya). The Devensian ice sheet effectively cleared the landscape of evidence for hominid activity and, although hand axes and other stone tools are occasionally found, glacial action has removed them from their original context and redeposited them. Some cave sites have, however, provided in situ remains in the wider region.
- 11.5.8 The Upper Palaeolithic is still poorly represented in the archaeological record for the Study Area, comprising a hand axe and a palaeochannel (buried prehistoric channel). Some open area sites have been identified in regions beyond the Study Area. Fieldwalking in the Trent and Derwent valleys has identified Late Upper Palaeolithic hunter-gatherer activity on the low terraces, valley sides and the gravel islands (Ref 11.22; 11.23), whilst Upper Palaeolithic artefacts have been identified near Scunthorpe, Risby Warren, and Salmonby.

To the north of the Study Area in Yorkshire, Upper Palaeolithic diagnostic lithic forms have been found in the vicinity of Star and Flixton Carrs, and around Wensleydale (Ref 11.24). Star Carr and Flixton Carrs are sites which bordered the glacial Lake Flixton and similar occupation may be seen around Lake Humber, which was a larger glacial lake.

- 11.5.9 The Devensian ice sheets had large impacts on the region within the Study Area. During the Palaeolithic period South Holderness was covered by the North Sea Lobe of the ice sheet (Ref 11.25). The North Sea Lobe, to its maximum extent, would also have covered most of the Study Area which falls within North and North-East Lincolnshire (Ref 11.26). The North Sea Lobe and Vale of York Lobe would have blocked drainage across the Humberhead Levels, leading to the formation of Lake Humber, which would have covered all of the Study Area west of the River Trent (Ref 11.27).
- 11.5.10 Due to the receding of glacial ice after the Last Glacial Maximum c. 27 kiloannum Before Present (ka BP) - drainage channels opened, and Lake Humber retracted over time. This produced terraces in the underlying geology formed by lake shorelines, and these resource-rich areas may have been attractive to Upper Palaeolithic communities (Ref 11.27). From c. 19ka – 17ka BP the North Sea Lobe would have retreated enough that the Study Area within North and North East Lincolnshire, as well as South Holderness, would have no longer been under icesheets and instead a glacial lake connected to Lake Humber (Ref 11.26). Between 17ka - 15ka BP, however, the North Sea Lobe would have re-advanced over South Holderness.
- 11.5.11 From 15ka BP the Devensian ice sheets were fully melted and Lake Humber silted up around 11ka BP, leaving a plain of rivers and hills across the landscape. Further terraces were produced in the underlying geology that formed by lake shorelines. These areas of rich resources may have been attractive to continue the settlement of Upper Palaeolithic communities in this area (Ref 11.27).

Mesolithic Period

- 11.5.12 The Mesolithic covers the period from the end of the Devensian glaciation at around 9,500 BCE and the onset of the Holocene Epoch through to the advent of the Neolithic. Activity in the area during the Mesolithic period is almost completely represented by deposits and lithic scatters recorded by the HER, including scrapers, blades, and debitage. Manipulated flint is found across the Study Area, with the largest distribution around North and North East

Lincolnshire. Alongside these finds is a single peat deposit, between Crowle and Keadby, west of the River Trent.

- 11.5.13 The archaeological evidence suggests small groups of hunter-gatherers, likely family groups, moved around the landscape on a seasonal rotation exploiting seasonally available resources. Mesolithic communities settled in areas with resource-rich terraces of geology and lake shorelines produced from glacial retreat. Areas like the Isle of Axholme, the River Humber and Holderness would have comprised wetland and woodland, providing habitats for fish and fowl resources which could be utilised (Ref 11.27, Ref 11.28). Within these landscapes there would also have been dryland sites, where different materials and fauna, such as deer, could be found.
- 11.5.14 Mesolithic communities were highly mobile and left little mark on the landscape, and so most sites comprise scatters of microliths, which are typologically distinct from earlier stone working industries of the Palaeolithic and those of the later Neolithic. This will have been the case within the Study Area, as local Mesolithic activity is largely reflected in lithic scatters. It is probable, however, that human communities alternated between periods of dispersal and aggregation. There is evidence from pollen to suggest Mesolithic communities used fire to clear land in order to improve new growth, attract game, and to encourage desired plant species (Ref 11.29).
- 11.5.15 Drier sites would have been at higher elevations in the landscape, where there could have been occupation sites or hunting camps. The potential for this can be seen in concentrations of flints around areas such as Boreas Hill, south-east of Paull in South Holderness, which sits in an area of raised glacial gravel deposits. Occupation of these sites may have been episodic, as seen at Star Carr and Flixton Carr. While a site of this character has not been found within close proximity to any section of the Study Area, Star Carr was found in an area on the edge of a previous glacial lake, Lake Flixton, which was smaller than Lake Humber that was partially located within the Study Area.

Neolithic Period

- 11.5.16 The Neolithic period marks the transition from transient hunter-gatherer societies to settled, farming communities. Within the Study Area, Neolithic finds include various lithic scatters across the landscape, palaeochannels, peat, trackways, as well as Neolithic mortuary enclosures. These assets support the idea of dispersed human activity and settlement in the area. In the Study Area, flint scatters are distributed across North Lincolnshire and around Paull in South

Holderness, with the flints around Paull located largely on islands of raised gravel deposits created by deposition from the Devensian ice sheet.

- 11.5.17 As in the Mesolithic period, the Neolithic landscape of the Study Area would have been characterized by areas of low-lying marsh and wetland with some higher, drier sections of the landscape. Sea levels would have been rising across the period, resulting in marine transgression into various sections of the landscape, such as the Ancholme valley and Keyingham Drain. The effect of these transgressions was the deposition of fine silt and clay on the valley floor as well as impeding freshwater run-off, causing the formation of alder carrs across lowland valleys. Peat growth in these floodplains appears to have sped up in later Prehistory, and peats have been found within the Study Area which dates to the Neolithic period (Ref 11.26).
- 11.5.18 These wetlands would have been utilized within this period, while some deposition of alluvial silt and clay on higher areas of the landscape would have developed fertile soil for agriculture. The two areas of the landscape would have enabled a mixture of farming, fishing and hunting. Activity can be seen in lowland areas across the Humber Wetlands. Flint finds have been identified outside the Study Area in the Keyingham Fleet Area and near the River Aire, areas which are partially within the Study Area west of the River Trent and in South Holderness (Ref 11.26).
- 11.5.19 The Neolithic period is also defined by the construction of funerary and ritual monuments, with the introduction of long barrows, cursuses (monumental Neolithic enclosure structures comprising parallel banks with external ditches or trenches), causeways and henges introduced across Britain. A scheduled Neolithic long barrow is located within the Study Area, north-west of Deepdale in North Lincolnshire, as well as another potential Neolithic barrow by Winterton and Winteringham.
- 11.5.20 The scheduled long barrow at Deepdale belongs to a distinctive regional grouping seen in North Lincolnshire defined by flanking ditches continuing around the ends of the barrow mound (Ref 11.30). The ditches are either continuous or broken by a single causeway at one end. Not all Lincolnshire long barrows had mounds and the current understanding of mortuary practice in Neolithic Lincolnshire is that the barrow mound was the final phase of monument construction, of which some monuments did not get to (Ref 11.30).
- 11.5.21 This barrow grouping is largely within the area of the North Lincolnshire Wolds, which contains over 60 long barrows. The other concentration of barrows in the Humber region is located on the Yorkshire Wold, with both Wold areas being

higher levels in the landscape. There are barrows found outside of the Wolds, however, with Neolithic barrows recorded at Easington and Kilnsea in South Holderness (Ref 11.26). Apart from a few exceptions outside the Study Area, however, the Humber Wetlands are largely lacking in monumental structures.

Bronze Age

- 11.5.22 The Bronze Age saw new, varying types of material culture introduced into Britain. As well as evidence of increasing social complexity and advances in agriculture, the Bronze Age in Britain is characterised by new forms of material culture. This includes new distinct types of flintwork, collared urns and Beaker pottery, as well as the introduction of copper, gold, and bronze objects. Within the Study Area material culture includes flints, copper alloy fragments, axes and pottery within North Lincolnshire, as well as flints located around Paull, just east of the River Humber, which may date to the Bronze Age. A single asset of Bronze Age provenance was located west of the River Trent in the Study Area, this being an unworked red deer antler.
- 11.5.23 As in the Neolithic, the Bronze Age landscape was a mix of lower wetlands and higher, drier sections in the landscape. Continued hunting and foraging in wetland areas around the River Humber have been assumed. There are no known Bronze Age settlements within wetlands within the area, with archaeological evidence pointing to occupation of camps and settlements on higher ground, with temporary movement into wetland areas (Ref 11.26).
- 11.5.24 Across Britain agriculture intensified, with Bronze Age farmers developing more extensive field systems across the landscape and opening up the land for agriculture, with increasing woodland clearance to make space for agriculture. Based on pollen analysis agriculture in the River Humber lowlands was predominantly concerned with livestock rather than arable production. Carr woodlands would have been largely inaccessible to livestock, but locations close to the estuary would have been biologically productive areas in the landscape more suitable to pastoralism (Ref 11.26).
- 11.5.25 The mortuary and monumental landscape of England changed in the Bronze Age, as round barrows superseded the long barrows, whilst the stone circle and henge traditions continued. Two scheduled barrows are located within the Study Area, at West Halton and Howe Hill, west of Wooton. These barrows are both in North Lincolnshire, but two potential further barrows are located east of the River Humber in South Holderness, by Patrington and Easington.
- 11.5.26 Bronze Age round barrows are often associated with a single burial in contrast to the communal funerary monuments of the Neolithic period. This may indicate

an increased stratification of society with only certain individuals deemed worthy of internment within such monuments, whilst cremation was practiced for others. The most numerous forms of round barrows are the bowl barrows, of which there are over 10,000 recorded nationally across lowland Britain and include the two Scheduled barrows within the Study Area. These monuments date to 2400-1500 BCE and are defined by earthen or rubble mounds, which cover single or multiple burials, as well as being sometimes ditched (Ref 11.31).

Iron Age Period

- 11.5.27 Across Britain the transition from the Late Bronze Age to the Early Iron Age saw a growth in population, growth in agricultural farming, the introduction of new technologies and material culture, increased social stratification, and increasing contact and trade with continental Europe.
- 11.5.28 In the Iron Age the landscape experienced widespread forest regeneration followed by further woodland clearances for pastoral and mixed farming, encouraging settlement during this period (Ref 11.27). Iron Age landscapes were still largely defined by farmsteads and small settlements associated with field systems, representing agricultural and pastoral production, linked by networks of trackways. Within the Study Area, there are some settlements in North Lincolnshire but, otherwise, the HER largely in the Study Area indicates a highly rural area where agriculture was the primary activity.
- 11.5.29 While the North Yorkshire, Isle of Axholme and Holderness regions are largely represented by rural and agricultural activity within the HER of the Study Area, there is a clear pattern of expanding settlement which would be the beginnings of nucleated settlements in the later period (Ref 11.27). The more concentrated settlements are seen in North and North East Lincolnshire at Yarborough hillfort, as well as the Kirmington, Killingholme Docks and Winterton settlements.
- 11.5.30 The settlements within the Study Area are located by the coastline, such as Kirmington and Killingholme. In the Iron Age increasing trade and travel by ships would have been linked to this. There is little direct evidence for port or harbour facilities themselves, however, as ships and boats in this period were small enough to land on beaches or shallow coastal areas (Ref 11.32; Ref 11.33; Ref 11.34). There were possibly important landfall locations along the River Humber, with South Ferriby, which is within the Study Area in North Lincolnshire, potentially being one of these (Ref 11.35).

- 11.5.31 One hillfort is located within the Study Area at Yarborough. The Iron Age is noted for hillforts although some hillforts, such as Mam Tor in the Peak District, have Bronze Age origins. Hillforts would have varied in function, structure and distribution across the country and the fort at Yarborough is one of few hillforts on the Lincolnshire Wolds. Apart from Yarborough there are no other forts within the Study Area and there will likely be few potential hillforts given the largely flat topography of the landscape.
- 11.5.32 Evidence of Iron Age burial and funerary practice is generally rare across Britain, including funerary monuments. Humberside does contain the Arras square barrow cemeteries in the Yorkshire Wolds (Ref 11.25). Funerary monuments are largely restricted to the East Riding of Yorkshire (Ref 11.36; Ref 11.37). Evidence of funerary monuments, however, is not seen within the Study Area.
- 11.5.33 Material culture became more diverse in the Iron Age due to advances in technology and farming practice, the adoption of new materials, such as iron, new art styles, as well as growing trade networks. At the Kirmington settlement Scheduled Monument, recorded finds include objects in the La Tène style, metalwork as well as a mix of local and imported wares. Finds of slag, fired clay and fire-cracked stones at a nucleated settlement by North Killingholme indicate metalworking activities in the area.

Roman Period

- 11.5.34 The Roman period in Britain followed the Roman Claudian invasion in 43 CE, although it took several years for Rome to establish their control as far north as the River Humber. The area leading up to the conquest was on the fringes of three tribal areas, namely the *Corieltavi*, *Brigantes*, and possibly, the *Parisi*. Although the *Corieltavi* made little resistance, it seems Roman control of the area was not strongly recognised until sometime after 51-71 CE. Although Rome began to exert control in this period, there already was a functional and cultural overlap between the Late Iron Age and Roman periods through the gradual adoption of material culture from the continent (including coinage) and the continuation of settlement of Iron Age sites.
- 11.5.35 Nevertheless, the years following the Roman conquest fundamentally transformed aspects of the political, social, and economic structure of Britain. The incorporation of Britain into the Roman Empire saw the advent of a new system of governance and a process of 'Romanisation' reflected in the built environment and in terms of access to (and local production of) Roman material culture.

- 11.5.36 Within the Study Area the Roman period is largely represented by military and rural agricultural sites. Military archaeology includes temporary camps and the establishment of Roman roads. This is apparent in Lincolnshire and Yorkshire with the presence of the Ermine Street heading towards the River Humber. Additionally, a number of subsidiary Roman roads are linked to the growing network of forts and towns, such as those at Lincoln, York and Kirmington. The latter of these is located inside the Study Area alongside the Roman road between South Ferriby and Horncastle.
- 11.5.37 Whilst the roads in this period were of notable importance for transport, river systems around Humberside would also have connected settlements, such as the Trent and Ouse rivers, allowing ship traffic to the regional capitals of York and Lincoln (Ref 11.27). A crossing of the River Humber was also likely located just north of Winteringham where it possibly connected to Ermine Street. Since the Roman period coastal sea level changes, including erosion and alluvial deposition, this may well obscure the full nature and extent of the Roman use of the River Humber and former coastline (Ref 11.38).
- 11.5.38 In rural areas many of the established Iron Age farmsteads and settlements saw continued occupation through to the Roman period, with establishment of villa estates intensifying rural production, which is seen across the Project, from Drax, through to North Lincolnshire. Possible Iron Age to Romano-British enclosures are visible across the route on cropmarks and through geophysical survey results, including in Holderness where HER records identify fewer Romano-British sites. These are more commonly identified in the East Riding of Yorkshire and North Lincolnshire in areas where lighter soils would have been easier to drain for small-scale pastoral farming (Ref 11.39). Larger Romano-British settlements have also been identified in Drax, within the draft Order Limits, and towards Kirmington within the Study Area. Sporadic findspots are common across the draft Order Limits of the Project and may suggest further Roman activity in rural areas.

Early Medieval Period

- 11.5.39 Following the end of Roman control in Britain in the early fifth century, the area around the River Humber came under the control of various British and Germanic political groups. Many Roman cultural practices were gradually abandoned, and the settlers introduced a new system of land management, involving more systematic methods of cultivation. Patterns of woodland clearance occurred during this period which had a lasting influence and is often reflected in the present-day parish boundaries through the influence they had. The early medieval period around the River Humber also sees some evidence

for drainage activities and marshland reclamation, although wetlands were certainly exploited and were more extensive than the present day (Ref 11.40).

- 11.5.40 The River Humber itself was an important means of transport by which Early Medieval settlers could travel further into Britain, as well as connecting rivers such as the River Trent and River Ouse which could be comfortably navigated. These rivers would have been used by Angle, Saxon and Scandinavian (Ref 11.39). It was also key to trading activities with evidence of continental trading at Humberside settlements.
- 11.5.41 The success of Early Medieval settlers is reflected in settlements across the wide landscape. Anglo-Saxon and Danelaw placenames and documentary evidence indicate the foundation of a number of settlements during this period, as well as a number of churches and religious houses.
- 11.5.42 The nucleated settlement pattern in the early medieval period is exhibited by the growth of hamlets and villages in the area as recorded by the Domesday Book of 1086, which clearly identifies the successful settlements of Drax and Barmby on the Marsh in North Yorkshire; Crowle, Adlingfleet and Coleby in North Lincolnshire, as well as Paull in Holderness.
- 11.5.43 Contemporary sources describe local nobilities and migrating Germanic groups from the continent, with the latter establishing themselves as local rulers. This is reflected in the archaeological record through Germanic style material culture, although the scale of this migration has been much contested. Scatters of pottery from the Anglo-Saxons, who traced origins to Germanic settlers, is seen in the Study Area. It is likely, also, that Romano-British culture continued in some areas for several years after the Roman withdrawal.
- 11.5.44 By the end of the seventh century, seven Anglo-Saxon Kingdoms had been established with modern Lincolnshire located within the Kingdom of Mercia and Modern Yorkshire within the Kingdom of Northumbria. Much of the Early Medieval activity within the Study Area is concentrated within North Lincolnshire in the settlements at Habrough, West Halton and Kirmington. In the Early Medieval period this area was originally part of the Kingdom of Lindsey, a small Anglo-Saxon kingdom, which was subsequently absorbed into the larger Kingdom of Northumbria in the seventh century.
- 11.5.45 The Lindsey territory was disputed between Northumbria and the Kingdom of Mercia and was under their alternating control. In 865 CE, following years of raiding, Scandinavians began colonising a large proportion of eastern and

northern England including Lincolnshire and Yorkshire. Danelaw was established in the region and was in place until 954 CE.

- 11.5.46 Settlement within the Study Area is partially reflected by the HER due to limited archaeological findspots, structures or deposits. One asset has been recorded, St Wilfred's Chapel, located east of Drax which suggests the continuation of settlement and activity in this area from the Roman period, and would have had a significant influence on the medieval landscape. This was discovered following a series of excavations in the 1960s discovering postholes associated with the former chapel. Scatters of pottery dating to the Early Medieval period have also been discovered in the Study Area near Garthorpe Grange, however it is likely that this is a stray loss or the effects of movement within the area.

Medieval Period

- 11.5.47 The inception of the Medieval period is marked by the Norman invasion of 1066 CE. This resulted in a new system of governance based on feudal ties and saw the consolidation of the monarchy.
- 11.5.48 The medieval period is heavily represented by the HER encapsulating the social, political and cultural changes in this period including the expansion of settlements, as well as the emergence of castles, churches, manorial estates, intensified agricultural practice and new forms of material culture. There are several moated sites, churches and settlements of medieval origins reflecting the medieval landscape. The moated sites would have been part of a network of manorial sites which define the economic, social and administrative spheres of medieval community, held by Norman nobility. A manor was a symbol of status and authority for the lord, which is reflected in the size and grand nature of the moated sites.
- 11.5.49 These assets are present across the entire route, including the Scheduled Monument of Castled Hill Moated Site, Scurff Hall, Baysgarth Farm, Paull Holme, and Winestead as well as several non-designated sites including Rusholme Hall, Mawgre Moated Site, Goxhill Marsh, and Camerton.
- 11.5.50 The medieval period also saw the continued occupation of settlements recorded in the Domesday Book as well as the establishment of many others. The majority of the cities, towns, villages and hamlets in the Study Area and wider landscape were consolidated or established in the Medieval period. Some of the established settlements in the Study Area include Barmby on the Marsh, East Cowick, Fockerby among others. Evidence of Medieval roots has been removed by continued post-medieval and modern developments in places like Hull and Scunthorpe. Other settlements, however, such as Hedon, Barton-on-

Humber and Patrington, have retained their medieval street plans and names at their cores.

- 11.5.51 While some settlements continued to thrive and develop during the Medieval period, many experienced large-scale depopulation and abandonment, seen within the Study Area through shrunken and deserted settlements, such as those at Croxton, Dimlington and Adlingfleet. The reasons for the shrinking and in some cases abandonment of some Medieval settlements are suggested to include several stresses, such as flooding during the thirteenth and fourteenth centuries, the Black Death in the fourteenth century and the fifteenth century Enclosure Act that transformed land from arable cultivation to pasture for sheep.
- 11.5.52 The settlements within the Study Area, and many others in the wider region, have Medieval churches at their cores, exemplifying the power and reach of the Medieval church. This is confirmed by the establishment of monasteries such as Thornton Abbey and Drax Augustinian Priory. The religious establishment saw major upheavals towards the end of the Medieval period when King Henry VIII ordered the dissolution of the monasteries in 1536 CE, and this is seen in the ruination of Thornton Abbey and Drax Augustinian Priory. Also, churches such as the Church of All Saint's in Adlingfleet, Church of St Peter and St Paul in Drax, Church of Saint Etheldreda in West Halton, and Church of Saint Germain in Winestead are examples of the ecclesiastical landscape across the scope of the Study Area.
- 11.5.53 Agriculture intensified in the Study Area in the Medieval period. As in previous periods, the landscape was one of lowland areas with areas of wetland and marsh. Palaeobotanical evidence from the Isle of Axholme indicates a resurgence of woodland, however, before agricultural intensification (Ref 11.27). The Medieval system of agriculture was defined by communal open strip field systems, which often surround nucleated villages and across the Study Area. These field systems have greatly impacted the landscape. The most evident remains of the medieval field systems are ridge and furrow earthworks including ridge and furrow at Rawcliffe; ridge and furrow and field systems at Goole; ridge and furrow at Crowle and Keadby and ridge and furrow associated with Scurff Hall moated manor site. These earthworks are a result of ploughing in the Medieval period, although subsequent ploughing in the post-medieval and industrial farming in the modern period has destroyed much of the ridge and furrow earthworks.

Post-Medieval Period

- 11.5.54 The post-medieval period is marked by significant social, economic, and religious change prompted by the Reformation, changes in farming practices, and increased industrialisation.
- 11.5.55 Within the region, the Reformation led to the dissolution of many monasteries, such as Drax Augustinian Priory and Thornton Abbey, and many monastic sites were transferred from the church to the nobility. This also resulted in the growth of non-conformism, evidenced throughout the Study Area in assets such as a listed Baptist church in Killingholme, records of Wesleyan chapels in Ulceby, South Killingholme, and Paull for example, and primitive Methodist chapels in Goole, South Killingholme, and Hedon for example, as well as the use of a farmhouse at Drax Augustinian Priory by a Quaker congregation.
- 11.5.56 An important development to the post-medieval landscape was the large-scale efforts undertaken towards drainage and land reclamation, which saw large drainage schemes conducted across lowland areas of Britain, converting wetlands into workable agriculture land. This impacts the Study Area, which is defined by large stretches of lowland, some of which was formerly marsh and wetlands.
- 11.5.57 In the Isle of Axholme area, a large drainage scheme was led by Dutch engineer Cornelius Vermuyden, the impacts of which are seen in cropmarks of warping drains, as well as the diverting of the original course of the River Don, which previously ran through the Study Area through Garthorpe and Adlingfleet. Drainage to expand the Sunken Island area, east of the River Humber, and Paull Holme, saw this land reclaimed largely from the River Humber itself, which was much wider in the 1600s. Villages in the area, such as Thorngumbald, Keyingham and Patrington, were previously situated on the banks of the estuary, with the land reclamation occurring between the 17th and 19th centuries (Ref 11.41).
- 11.5.58 Drainage schemes are represented in the archaeology of the area largely in the form of field drains, warping drains and warping deposits. There is evidence to suggest the practice of warping in the region had Medieval origins, but the industrialisation and intensification of the process occurred in the post-medieval period. The process of warping comprises the introduction of silt-laden water via a series of drains on to non-productive land such as moor, marsh and peatland. The silts were allowed to settle out, creating more fertile earth and raising the local ground level before the land was drained again. This process could be repeated until the original ground surface was buried under metres of warp

deposit. Across the route of the Project, numerous farms and farmsteads were established in this period, some possibly having earlier origins, several of which taking advantage of reclaimed land.

- 11.5.59 The post-medieval period saw the establishment of new transport networks including canals, railways, and roads. Drainage and channel improvements made between the 17th and early 19th centuries led to the introduction of several canals and navigations including the River Ancholme and Aire & Calder Navigation Canal. By the mid-19th century several railways were also established, largely to help facilitate the flow of increasing coal and goods to Hull, Goole, and the River Humber, as well as transporting people to the coast of Holderness. The establishment of some of these lines was also made possible via the drainage operations, reclaiming former wetlands.
- 11.5.60 The post-medieval industrialisation of the country is exemplified in the region by the rapid expansion of towns into industrial centres such as Hull and Scunthorpe outside the Study Area, and the establishment of Goole within the Study Area. The port town of Goole was purpose-built as a “company town” by the Aire and Calder Navigation Company, who built the canal from Leeds to Goole and docks leading into the River Ouse. The building of Goole is a pivotal moment and provides an important historic context for the understanding of the growing industry in Humberside and Yorkshire, particularly the coal industry. Goole received its charter as a port in 1826 AD and grew rapidly throughout the 19th century.

Modern Period

- 11.5.61 The Modern period is marked by the development and intensification of agricultural production in the region and the expansion of infrastructure, particularly the road and rail networks, as well as power generation. Much of the region retains a rural character with dispersed village settlements and larger settlements focused around industrial centres. The post-medieval farming landscape remains largely still visible, despite the amalgamation of former Medieval and Post-Medieval land divisions to suit modern farming practices.
- 11.5.62 Immingham, on the south bank of the River Humber, and Hull, on the north bank, experienced rapid development to accommodate access to global trade networks. Many of the larger settlements in the region saw increased urbanisation in the Modern period with many settlements increasing in size to accommodate a growing population.
- 11.5.63 The landscape Project saw an intensification of military activity due to the First and Second World Wars. Within the Study Area, this occurs particularly in the

eastern portion of the Project, around the River Humber. Army camps and air bases were built, alongside military defences to protect military installations and settlements like Hull and Scunthorpe, where there were larger populations and significant industrial activity. Defensive measures seen within the Study Area included searchlight batteries, quartz fire-bombing decoys, anti-aircraft batteries and barrage balloons.

- 11.5.64 The landscape of the Project is growing an energy focus in the modern day. Smaller energy infrastructure is also visible across the Project, through the presence of multiple wind farms.

Historic Landscape Character

Section 1 – Drax to River Trent

- 11.5.65 The mainline draft Order Limits for Section 1 begin in North Yorkshire, within the Selby district, largely located within Natural England's National Character Area 39: Humberhead Levels and within Local Character Area 5 – Ouse Valley (Ref 11.42) – LUC 2019) although it does partially include Character Area 15 – Camblesforth Farmland to the south of the Drax. The draft Order Limits head in a southeastern direction between the settlements of Long Drax and Drax, and slightly cross over the East Riding of Yorkshire, towards Barmby-on-Marsh within Landscape Character Area (LCA) 4 – River Corridors, which remains in National Character Area 39: The Humberhead Levels (Ref 11.43 – AECOM 2018). The areas around Long Drax and Drax are defined by the Landscape Character Type 24: River Floodplain, sitting adjacent to the River Humber. This part of the landscape is fragmented due to the intrusion of major infrastructure such as Drax Power Station and Rusholme Wind Farm, with some types of 19th century enclosure fields but no earlier ones, and much more modern fields. There is also evidence of the surviving earlier Medieval use of the landscape in this area of Long Drax consisting of fossilised strip fields, around the vicinity of Drax Abbey. The area around Barmby-on-Marsh falls within Character Area 4B - River Ouse Corridor, with the majority of the landscape consisting of mixed typed enclosure fields of various size and shape from the 16th-19th centuries, focused around the historical linear settlements that retain their character. The combination of the rivers, the intermittent vegetation (including areas of scrub grassland (HHU8021), extensive riverbanks and flat floodplains) creates an open landscape with open views.
- 11.5.66 Overall, there are landscape types within the area of North Yorkshire that demonstrate aspects of time-depth. These are the agricultural types of piecemeal, early and parliamentary planned enclosures. They are associated

with surviving Medieval and Post-Medieval heritage assets and the settlements at Drax and Newland. Modern developments such as semi-open farming practices, settlement expansion, energy, military and transport infrastructure have each added to the fragmentation of the historic landscape. The introduction of the railway marked the transition to Modern, industrial landscape, that continues with the development of roads, settlement expansion and energy infrastructure, which starts geographically from Drax and stretches south across the River Humber / the East Riding of Yorkshire and North Lincolnshire landscapes. Despite these changes, much of the landscape remains rural and agricultural, illustrating the time-depth and impact of industry on the region. The early, piecemeal and parliamentary planned enclosures and historical settlements (including farmsteads) are of medium value, whilst the Modern fields, Modern housing and industry are of low value.

- 11.5.67 Moving southwards, the draft Order Limits head towards the border of the East Riding of Yorkshire (west of Rawcliffe) within North Lincolnshire, crossing over the Dutch Canal, within LCA 8: M62 Corridor Farmland. Specifically, the area falls within LCA 8C and is characterised by the presence of the M62, other linear roads / major bridges and swing bridges. Due to modern intrusion of roads and bridges, there are a high proportion of Modern field enclosures in this character area of various sizes, albeit for a small portion of parliamentary planned enclosures. However modern road infrastructure (the A614 and A645), and the aforementioned major utilities have introduced significant visual intrusion into the flat landscape.

- 11.5.68 The draft Order Limits crosses into Landscape Character Area 9: Drained Open Farmland, specifically subarea 9B: Goole Fields. LCA 9B: Goole Fields covers the land between Rawcliffe Bridge in the west and the ends west of Swinefleet in the east. Farmsteads are notably sparser in this area, and all settlement consists of minor linear villages adjacent to the river Ouse. There are a high proportion of early enclosures due to the lack of infrastructure and parliamentary planned enclosures. These fields are typically bounded by hedgerows and drainage channels.

- 11.5.69 To the east is the final character area in the East Riding of Yorkshire - Character Area 9C: Twin Rivers Farmland. This comprises the land between Swinefleet through the landscape south of Reedness, Whitgift and Ousefleet up to and including Adlingfleet. The rectilinear enclosures abruptly end and are replaced with medium to large, irregular square and rectangular Modern fields with a few dispersed farmsteads. The key feature types here are predominantly Modern field enclosures of rectilinear and irregular shapes of various sizes, with the exception of a small portion of parliamentary planned enclosure fields. This

landscape type continues eastwards through to Garthorpe and consists of a rural character with minimal settlement in the area, aside from scattered farmsteads connected by windy roads. As a result, long extensive views are granted across the landscape.

- 11.5.70 Overall, the East Riding of Yorkshire landscape has retained some Medieval to Post-Medieval historic character, though this has been significantly fragmented due to transport infrastructure and the transition to Modern farming. The landscape represented by Character Areas 8 and 9 is predominantly rural and largely dominated by Modern improved fields (dating from the 1870s), with the remaining fields a mix of early enclosures (dating from the 1500s) and parliamentary planned enclosures (dating from the 1750s). These rural agricultural fields are lined with drainage ditches and other land management techniques such as banks adjacent to the river, which maintain these land types. Settlements are few, linear and often focused on the Aire, Ouse and Derwent. With the exception of Goole, these settlements retain their traditional characters, resisting urban expansion. This historic rural character is fragmented by transport, energy and utilities infrastructure that are very visible amongst the flat low-lying landscape. The early, piecemeal and parliamentary planned enclosures and historical settlements (including farmsteads) are of medium value, whilst the Modern fields, Modern housing and industry are of low value.
- 11.5.71 There is a section of the draft Order Limits that head southwards into the Keadby Spur section, which begins south of Swinefleet in the East Riding of Yorkshire and passes south / southeast through the Isle of Axholme in North Lincolnshire to terminate at Keadby. This area falls initially within Character Area 9C: Twin Rivers Farmland in the East Riding of Yorkshire and then within the character zones of The Don Floodplain (CON1), and The Axholme Fens (CON3) in the Isle of Axholme. All of these are grouped within the overarching Regional Character Area 1: The Confluence within the National Character Areas 39: The Humberhead Levels and 41: the River Humber. The Isle of Axholme comprises higher ground of low hills, one larger with smaller satellite islands, surrounded by flat, drained former marshland. Remaining common land was subsequently enclosed through Acts of Parliament in the 19th century, creating a mix of enclosures, with few accompanying historic farmsteads. There is a clear retention of parliamentary enclosure types in the area between Crowle and Eastoft villages retaining a legibility of the Medieval to Post-Medieval historic character. The settlements in this area vary in size and character, with Eastoft being a village, Crowle a linear market town and others have a more nucleated character – such as Ealand. Historic enclosures have survived in the more rural parts of the Isle (in the northern half) and spur route, with a greater

concentration of modern and larger fields around the settlements and the southern part of the Isle. Overall, the early, piecemeal and parliamentary planned enclosures and historical settlements (including farmsteads) are of medium value, whilst the Modern fields are of low value.

- 11.5.72 Heading southeast / east from Crowle the spur route terminates at Keadby. The field types are dominated by private and planned enclosures that are often accompanied by historic farmsteads, generally found at the end of the long and straight roads that bind groups of the enclosures. The enclosures are found in the north of the Keadby and Althorpe area and around the two historic linear settlements, with modern fields instead found around the power station which serves as a visual intrusion on the flat fenland landscape due to its high-rise towers and electricity pylons. The early, piecemeal and parliamentary planned enclosures and historical settlements (including farmsteads) are of medium value, whilst the Modern fields and industry are of low value.

Section 1 Impact

- 11.5.73 The historic settlement cores, historic earthworks and ancient enclosures of this section's medieval landscape all fall outside of the draft Order Limits. However, the historic settlement cores found at Drax, Newland and Rawcliffe, as well as the historic earthworks found at Drax Abbey and the various moated sites near Drax and Newland, are all adjacent / nearby to the draft Order Limits. Most lie near access roads to proposed AGI compounds, therefore their settings may be impacted during the Project's construction and operation phase. The isolated farmsteads of this section's 18th-19th century landscape all fall outside of the draft Order Limits, however some are located adjacent to the draft Order Limits, and their setting may extend, as defined in Appendix 11.5. Many of them are grouped within early enclosures from the 16th century that are also of historic value.
- 11.5.74 Construction activities would result in machinery movement, increased traffic, noise from traffic and machinery, and waste material in the area which will have a slight change to the setting of some of the historic settlement cores, historic earthworks, and isolated farmsteads. The Project aims to mitigate impacts from construction related activities with an oCEMP and a Construction Traffic Management Plan (CTMP) that includes traffic and waste management practices. The construction phase will only slightly and temporarily alter the landscape type's' contributions to the clarity of this section's Medieval and Post-Medieval landscape types. As a result, there will be no impact on the parliamentary planned enclosures, but there will be a negligible magnitude of impact from Project construction which will have a negligible significance of

effect on the historic settlement core, historic earthwork, and isolated farmstead landscape types. It is intended that the Project will be routed underground, and this will remove most of the impacts to the landscape in the construction phase.

- 11.5.75 The draft Order Limits in Section 1 mostly pass through a mix of fields of planned enclosures and modern fields in North Yorkshire, and then fields of modern date in the East Riding of Yorkshire, followed with the section of early enclosures and then ending with modern fields again. Adjacent to the modern fields are a scattering of discrete parliamentary planned enclosures. All aforementioned historic field landscape types within the draft Order Limits (planned enclosures and early enclosures) will experience a temporary physical impact during the construction phase of the Project through pipeline construction and routeing, AGIs, and vehicle and machine access to construction working areas. Whilst these construction activities do not alter the shape and formation of the field patterns, as the proposed AGIs and temporary construction compounds are contained within individual field boundaries, there will be some boundary alteration during the construction of the pipeline through tree and hedgerow removal. Whilst the Project aims to mitigate impact from construction related activities by avoiding established trees and using existing gaps in hedgerows for routeing the pipeline, boundary removal in certain sections is unavoidable and possibly permanent. Project construction activities will also temporarily introduce a modern industrial setting to these historic landscape types and as a result, will impact their legibility. There will be a medium magnitude of impact from Project construction which will have a moderate significance of effect on the planned enclosure and early enclosure landscape types, and a minor significance of effect on the modern field landscape type in section 1.
- 11.5.76 The Project's operational phase will see the removal of most of the temporary impacts brought by Project construction; however, the Project will introduce some permanent operational changes through the five proposed AGIs in this section, four in the main route corridor and one in Keadby Spur. Two of them would be sited away from historic settlements and thus there will be no impact to the historic settlement cores or isolated farmstead historic landscape types. The AGIs are situated on predominantly modern fields and are located within existing boundaries of individual fields. The AGI locations will not alter the existing fields' shape or pattern but will introduce a permanent industrial element to these landscape types. These permanent changes will slightly impact the historic legibility of the planned enclosure that contains one of the AGI sites. As a result, there will be a low magnitude of impact from Project operation, which will have a minor significance of effect on the parliamentary

planned enclosure landscape type, and a negligible significance of effect on the modern field landscape type in section 1.

Section 2 – River Trent to River Humber

- 11.5.77 The draft Order Limits for section 2 begin on the eastern side of the River Trent in Northern Lincolnshire, between the villages of Alkborough and Barton Upon Stather. They head in a southeastern direction between the villages of Coleby and West Halton, where they then progress eastward between the villages of South Ferriby and Horkstow towards Barrow Upon Humber. This part of Section 2 lies within Natural England's National Character Area 45: Northern Lincolnshire Edge With Cover Sands, National Character Area 44: Central Lincolnshire Vale, and National Character Area 43: Lincolnshire Wolds (Ref 11.44) Within This National Character area, the draft Order Limits lie within Lincolnshire County Council's Regional Character Area NCL5: The Normanby Scarp, CLV4: the Ancholme Carrs, and WOL2: The Caistor Spring Line (Ref 11.44).
- 11.5.78 The landscape that exists today is largely an outgrowth of the medieval open field farming regime and NCL5 still has a nucleated settlement pattern, located outside the draft Order Limits largely pertaining to this period, and most villages exhibit a well-preserved village core with very little modern development, such as West Halton and Coleby. The exception to this is Burton-upon-Stather, the largest village in NCL5, which includes a variety of 20th-century housing developments. Comparatively, the nucleated settlements in WOL2, such as the early medieval settlement of Horkstow, are much smaller and CLV4 has only a few scattered throughout the zone, and in both of these zones these settlements have expanded beyond their core with modern housing.
- 11.5.79 None of these settlements in NCL5, CLV4 and WOL2 lie within the draft Order Limits, apart from West Halton, Coleby and Horkstow which all lie within the 500m buffer area. In NCL5 the general nucleated pattern is interrupted away from the main settlements, with a substantial number of brick-built isolated farm complexes which often retain their historic farm buildings, creating a secondary dispersed settlement pattern in parallel to the original pattern of nucleation. These isolated scattered farm complexes also make up the main settlement type in CLV4 and WOL2.
- 11.5.80 Much of the medieval field pattern has been removed by the planned parliamentary enclosure of the 19th and 18th centuries and the rural landscape in both NCL5, CLV4 and WOL2 is now dominated by large modern fields of generally irregular shape. However, elements of the modern fieldscape, such as

relict field boundaries and drainage ditches does create a strong rectilinear pattern and there is some survival of older planned enclosures distributed fairly evenly throughout the zones.

- 11.5.81 Overall, there are landscape types within NCL5, CLV4, and WOL2 that demonstrate aspects of time-depth: whilst the medieval landscape has largely been removed by later processes, the pattern of settlement, despite some modern intrusions, is still largely legible from that period, but these settlements do not sit within the draft Order Limits.
- 11.5.82 The 18th and 19th century enclosure landscape can be seen throughout the zone in isolated pockets of intact rectilinear fields and the secondary settlement pattern of scattered isolated farmsteads. Although most of the rural landscape is the result 20th century consolidation of fields, there are enough surviving parliamentary planned enclosure boundaries to provide a high legibility of the former landscape. The parliamentary planned enclosure, the historic settlement core, and isolated farmstead landscape types are of **medium** value, whilst the modern field landscape type is of **low** value.
- 11.5.83 From Barrow Upon Humber, the draft Order Limits fork in two directions and head east towards East Halton and the River Humber, and south, where they terminate at Kirmington. At East Halton the draft Order Limits continues south for a spur line and head northeast over the River Humber and south, where they terminate between Habrough and Immingham. This part of section 2 lies within Natural England's Character Area 43: Lincolnshire Wolds, National Character Area 42: Lincolnshire Coast and Marshes, and National Character Area 41: Humber Estuary (Ref 11.44). Within this National Character Area the draft Order Limits lie within Lincolnshire County Council's Regional Character Areas WOL1: The Brocklesby Heath, NOM1: The Humber Bank, and NOM2 The Immingham Coastal Marshes (Ref 11.46).
- 11.5.84 This section has similar characteristics to the previous zones located in Section 2 and WOL1 has equal areas of surviving planned enclosure and large arable modern fields, irregularly interspersed with small historic settlements with very little modern development, such as the medieval settlement of Wootton (not within the draft Order Limits).
- 11.5.85 NOM1 is primarily rural with large open fields that have a strong rectilinear character, indicative of the planned drainage and enclosure of the historic marshland that once covered the area. Like the previous zones this area has a good mix of planned enclosure and modern arable fields interspersed with isolated farmsteads. Historic settlements in the zone run in two distinct lines

parallel to the shore of the River Humber and the eastern line, from Habrough to East Halton, is noted for the survival of several medieval moated sites including historic earthworks and a few ancient enclosures.

- 11.5.86 There is also surviving medieval earthworks at Thornton Abbey where it is possible that some of the isolated farmsteads in the area were founded at the same time as granges attached to the monastic estate. There are two former RAF airfields in NOM1 at Goxhill and Killingholme and they both retain features such as hangers and runways in identifiable forms, however both of these military airfields are outside of the draft Order Limits. The coastal landscape of NOM2, which falls outside of the draft Order Limits, is dominated by modern industrial activity, in particular installations related to the petrochemical industry and docks. The development of Immingham port in the 20th century led to the establishment of other industrial facilities in the surrounding area and there are very few fields of any type within this zone.
- 11.5.87 Overall, there are landscape types within WOL2, NOM1 and NOM2 that demonstrate aspects of time-depth; whilst the medieval landscape has largely been removed by later development and agricultural practice in WOL2 and NOM2, the medieval landscape is still legible in NOM1 where there is good survival of ancient medieval settlements with examples of ancient enclosure, particularly around East Halton, and the medieval earthworks at Thornton Abbey. The 18th and 19th century enclosure landscape can be seen throughout the zone by the many surviving rectilinear fields in the area.
- 11.5.88 Although the rural landscape in WOL2 and NOM1 is mainly the result of 20th century consolidation of fields, these fields do have elements that echo the rectilinear character of the parliamentary planned enclosures and there are enough surviving parliamentary planned enclosure boundaries to provide a high legibility of the former landscape. Although the modern industrial landscape of NOM2 does not immediately appear to retain any traces of preceding landscapes, the current industrial developments are typically aligned according to the planned field systems over which they were built. The historic earthwork, ancient enclosure, parliamentary planned enclosure, historic settlement core, and isolated farmstead landscape types are of **medium** value, whilst the modern field and industrial land landscape types are of **low** value.

Section 2 Impact

- 11.5.89 The historic settlement cores, historic earthworks and ancient enclosures of this section's medieval landscape all fall outside of the draft Order Limits. However, the historic settlement cores found at West Halton, Coleby, Horkstow, Wootton

and East Halton are all adjacent to the draft Order Limits within the Study Area, and most lie near Horizontal Directional Drill (HDD) sections and trenchless crossing compounds.

- 11.5.90 The historic earthworks found at Thornton Abbey also border the draft Order Limits and are next to an HDD section, trenchless crossing compound and a proposed AGI. The isolated farmsteads of this section's 18th - 19th century landscape all fall out outside of the draft Order Limits, however there are a few examples of this landscape type along the route of the draft Order Limits that either lay adjacent to its border, or near HDD sections and trenchless crossing compounds. Like the ancient enclosures, the industrial land of the modern landscape also falls outside of the draft Order Limits. Construction activities would result in machinery movement and noise, increased traffic, noise and waste material in the area which will have a slight change to the setting of some of the historic settlement cores, historic earthworks, and isolated farmsteads.
- 11.5.91 The Project aims to mitigate impact from construction related activities with a CTMP for traffic mitigation, and an oCEMP that includes waste management practices. The construction phase will only slightly and temporarily alter these landscape type's contributions to the legibility of this sections medieval and 18th-19th century enclosure landscapes. As a result, there will be **no impact** on the ancient enclosure and industrial land landscape types, but there will be a **negligible** magnitude of impact from Project construction which will have a **negligible** significance of effect on the historic settlement core, historic earthwork, and isolated farmstead landscape types.
- 11.5.92 It is intended that the Project will be undergrounded, and this will remove most of the impacts to the landscape types seen in the construction phase once the Project is in the operational phase.
- 11.5.93 However, the Project will introduce some permanent operational changes to the landscape through the presence of five proposed AGIs in this section. Due to their location outside of the draft Order Limits and having no interaction with any AGI, there will be **no impact** to the historic settlement core, ancient enclosure, isolated farmstead, and industrial land landscape types.
- 11.5.94 Although, the historic earthworks found at Thornton Abbey, although located outside of the draft Order Limits, are adjacent to a proposed AGI and there will be intervisibility between them. As a result, there will be a minor change to the rural setting of this landscape type in this area, however this will not affect this landscape type's contribution as a whole to the legibility of the medieval landscape in this section. Therefore, there will be **no change** in magnitude of

impact from Project operation which will have a **neutral** significance of effect on the historic earthwork landscape type in section 2.

- 11.5.95 The land within the draft Order Limits in section 2 is made up of two landscape types: parliamentary planned enclosures and modern fields. Both landscape types will experience a temporary physical impact during the construction phase of the Project through pipeline and AGI construction, including the utilisation of crossing compounds, temporary construction compounds, and vehicle and machine access to construction working areas. Whilst these construction activities do not alter the shape and formation of the field patterns, as the footprints of the trenchless crossing compounds, HDD sections, AGIs and temporary construction compounds are contained within individual field boundaries, there will be some boundary alteration during the construction of the pipeline through tree and hedgerow removal.
- 11.5.96 The Project aims to mitigate impact from construction related activities by avoiding established trees and hedgerow removal and using existing gaps in hedgerows and between mature trees for routeing the pipeline. However, boundary removal in certain sections is unavoidable and possibly permanent. Project construction activities will also temporarily introduce a contemporary industrial element to these landscape types and as a result, will alter these landscape type's contribution to the legibility of the 18th and 19th century enclosure and modern farming landscapes in this section. There will be a **medium** magnitude of impact from Project construction which will have a **moderate** significance of effect on the parliamentary planned enclosure landscape type, and a **minor** significance of effect on the modern field landscape type in section 2.
- 11.5.97 The Project operational phase will see the removal of most of the temporary impacts brought by Project construction; however, the Project will introduce some permanent operational changes through the five proposed AGIs in this section. Whilst the AGIs, which are situated on an even proportion of parliamentary enclosed and modern fields, are located within existing boundaries of individual fields and will not alter the field shape or pattern, they will introduce a permanent industrial element to these landscape types.
- 11.5.98 These permanent changes will slightly alter the contribution these landscape types have to the legibility of the 19th-18th century and modern farming landscapes. As a result, there will be a **low** magnitude of impact from Project operation, which will have a **minor** significance of effect on the parliamentary planned enclosure landscape type, and a **negligible** significance of effect on the modern field landscape type in section 2.

Section 3 – River Humber to Easington

- 11.5.99 In this Section, the draft Order Limits begin in the north bank of the River Humber in the East Riding of Yorkshire, in Landscape Character Area 21 – Drained Farmland, which is within National Character Area 41: Humber Estuary (Ref 11.43). The coastal landscape dominates LCA 21, consisting of the village of Paull, Sunk Island and Spurn Point.
- 11.5.100 A key feature of the area are extensive mud flats from the interface between the northern side of the River Humber. The mud flats continue along the north bank of the riverside, occupying the western side of the LCA 21C. The draft Order Limits branch northwards towards Paull into LCA 21D. Here the character areas are defined by a mixture of mud flats and 19th century modern field enclosures of various sizes, albeit for a small portion of parliamentary planned enclosures.
- 11.5.101 The LCA 21D includes the historic settlement of Paull and the historic Paull Holme Fort, which for centuries has been a cultural landmark in the region linking it to the region's Medieval defence history. The landscape consists of a coastal lowland character, extensive riverbanks, intertidal mudflats and a flat, open landscape allowing for uninterrupted views which contributes to the distinctive and multifaceted landscape of the River Humber region.
- 11.5.102 Moving eastwards, the draft Order Limits head in a southeastern direction passing through the landscape south of the villages of Thorngumbald, Keyingham and Ottringham. Specifically, the draft Order Limits fork into two directions and adjoin west of Keyingham within LCA 21C. The landscape is represented as predominantly rural and largely dominated by Modern enclosed fields (dating from the 1870s) of rectilinear and regular shapes, although smaller.
- 11.5.103 The remaining fields are a mix of early enclosures and parliamentary planned enclosures retaining a Medieval to Post-Medieval historic character. Settlements are few and far between, with several isolated farmsteads connected by windy roads allowing for open and extensive views across the landscape. There are several small woodlands around farmsteads and hamlets.
- 11.5.104 Overall, the River Humber landscape within the East Riding of Yorkshire offers legibility of its rural agricultural landscape with a flat, low lying character. Whilst there has been significant reorganisation of field enclosures, with the majority of the landscape defined by modern enclosures owing to the 20th century land reclamation, surviving fields of early enclosures and parliamentary planned enclosures are evident through the rectilinear and regular shapes of fields.

- 11.5.105 The sparse scattered settlements around LCA 21, with minimal modern development and well-preserved villages, resonate the Medieval to Post-Medieval landscape and contribute to the historic context of this region. As such, the early enclosure types, parliamentary planned enclosure types, isolated farmstead types and historic settlement cores are of **medium** value, and the modern field types are of **low** value.
- 11.5.106 The draft Order Limits continue in an eastern direction passing through National Character Area 40: Holderness (Ref 11.43), extending adjacent to the settlements of Winestead and Patrington, which both lie within LCA 19E, and through the coastal landscape of Easington where they terminate, which is within LCA 20A.
- 11.5.107 The landscape type of LCA 19E largely comprises of flat agricultural land with limited woodland. Much of the medieval field pattern has been lost due to 18th and 19th century pre-parliamentary enclosures and Modern improved fields in this character area. There is a distinct irregularity in size and shape of fields in this character area, owing to the high proportion of 19th century Modern fields, with only pockets of rectilinear enclosure fields in the area. The area comprises of dispersed settlements and farmsteads connected by windy roads. The settlements are nucleated, centred around a linear village core with only a small amount of expansion of modern housing. The primary settlement in this character area is Patrington which is linear in form and retains a well-preserved domestic historic character, despite intervening modern built form. No settlements here are located within the draft Order Limits.
- 11.5.108 To the east lies LCA 20A which is the final character area dissected by the draft Order Limits. The extant landscape in this area is has a flat to gently undulating topography that slopes eastwards towards the coast meeting eroding cliffs. The area has a strong remote character, dominated by large modern fields of varied size and shape predominantly used for arable farming.
- 11.5.109 There are some elements of relict field boundaries and surviving planned enclosures, but these are scarce. Settlement is widely dispersed around this character area, many of the settlements are linear in form situated east to west leading towards Spurn Heritage Coast, with the remainder limited to isolated farmsteads. Easington is one of the larger villages in this character area which contains a Natural Gas Terminal situated in the north and comprises of a dramatic eroding coastline sitting on the boulder clay cliffs.
- 11.5.110 The modern infrastructure is a visual intrusion on the otherwise remote character of the coastline. Another highly visible modern development is the

Out Newton wind farm situated north of Easington which further impacts the open long sightlines. The draft Order Limits terminate within the manufacturing and commercial landscape north of Easington village. Field pattern is highly irregular around the village of Easington and the nearby village of Holmpton, with dense tree cover around villages preventing views of the nearby modern infrastructure. Elsewhere in the character area, fields are distributed in a regular pattern, large and rectilinear in shape.

- 11.5.111 Overall, the Holderness landscape within the East Riding of Yorkshire retains a flat, agricultural landscape with a strong remote character, possessing minimal trees and vegetation. The exposed landscape continues eastwards becoming a coastal landscape with dramatic cliffs where the historic settlement of Easington is located.
- 11.5.112 The majority of the landscape is dominated by modern fields following consolidation of land in the 19th century, and limited survival of medieval landscape, particularly around the villages of Easington and Holmpton. However, the variety of landscape types in the area demonstrates aspects of time-depth. Survival of isolated farmsteads throughout the zone away from the settlements comprises of rectilinear fields echoing ancient enclosures, though due to the scarcity of these within this character area the former medieval landscape has been largely lost.
- 11.5.113 The modern industrial landscape of LCA 20A also has posed a significant change on the area around the north of Easington, impacting the remote character of the coastal landscape. The limited number of early enclosures, isolated farmstead landscape types and historic settlement cores are of **medium** value, whilst the modern field and industrial landscape types are of **low** value.

Section 3 Impact

- 11.5.114 The historic settlement cores found in this section all fall outside of the draft Order Limits. However, those found at Paull, Winestead, and Patrington are all adjacent to the draft Order Limits and are near temporary construction compounds, and trenchless crossing compounds, there are also two AGIs located to the north of Paull. The isolated farmsteads of this section's 18th-19th century landscape all fall out outside of the draft Order Limits, however there are a few examples of this landscape type along the route of draft Order Limits that lay adjacent to its border.
- 11.5.115 Construction activities would result in machinery movement and noise, increased traffic, noise and waste material in the area which will have a slight

change to the setting of some of the historic settlement cores and isolated farmsteads.

- 11.5.116 The Project aims to mitigate impact from construction related activities with an oCEMP and a CTMP that includes waste and traffic management practices, and the construction phase will only slightly and temporarily alter these landscape type's contributions to the legibility of this section's medieval and 18th-19th century enclosure landscapes.
- 11.5.117 As a result, there will be **no impact** on the industrial land landscape types, but there will be a **negligible** magnitude of impact from Project construction which will have a **negligible** significance of effect on the historic settlement core and isolated farmstead landscape types.
- 11.5.118 It is intended that the Project will be undergrounded, and this will remove most of the impacts to the landscape types seen in the construction phase once the Project is in the operational phase. However, the Project will introduce some permanent operational changes to the landscape through the presence of the proposed AGIs within this section.
- 11.5.119 Due to their location outside of the draft Order Limits and having no interaction with any AGI, there will be **no impact** to the isolated farmstead landscape type. However, there are two proposed AGIs located to the north of the historic settlement core of Paull, and whilst the most northern AGI will be in an area of existing industrial land, the other occupies a rural and open space which increases the encroachment of the existing industrial land on this area's rural character.
- 11.5.120 As a result, there will be a minor change to the rural setting of the historic core landscape type in this area, however this will not affect this landscape type's contribution as a whole to the legibility of the historic landscape in this section. Therefore, there will be **no change** in magnitude of impact from Project operation which will have a **neutral** significance of effect on the historic core landscape type in section 3.
- 11.5.121 The land within the draft Order Limits in section 3 is made up of five landscape types: early enclosure, parliamentary planned enclosures, mud flats, modern fields and industrial land. Whilst most of the land within the draft Order Limits are modern fields, all landscape types will experience a temporary physical impact during the construction phase of the Project through pipeline construction and routeing, the installation of HDD sections, trenchless crossing

compounds, temporary construction compounds, AGIs, and vehicle and machine access to construction working areas.

- 11.5.122 These construction activities do not alter the shape and formation of the field patterns, as the footprints of the trenchless crossing compounds, HDD sections, AGIs and temporary construction compounds are contained within individual field boundaries, there will be some boundary alteration during the construction of the pipeline through tree and hedgerow removal.
- 11.5.123 Whilst the Project aims to mitigate impact from construction related activities by avoiding established trees and hedgerow removal and using existing gaps in hedgerows and between mature trees for routeing the pipeline, boundary removal in certain sections is unavoidable and possibly permanent.
- 11.5.124 Project Construction activities will also temporarily introduce a contemporary industrial element to these landscape types and, as a result, will alter these landscape type's contribution to the legibility of the medieval enclosure, 18th and 19th century enclosure and modern farming landscapes in this section.
- 11.5.125 There will be a **medium** magnitude of impact from Project construction which will have a **moderate** significance of effect on the early enclosure and parliamentary planned enclosure landscape type, and a **minor** significance of effect on the modern field and mud flat landscape types in section 3. However, there will be a **negligible** magnitude of impact to the industrial landscape type from Project construction which will have a **negligible** significance of effect on this landscape type in section 3.
- 11.5.126 The Project operation phase will see the removal of most of the temporary impacts brought by Project construction; however, the Project will introduce some permanent operational changes through the proposed AGIs in this section. One of the AGIs is located on extant industrial land and due to its industrial nature will have **no change** in magnitude of impact from Project operation which will have a **neutral** significance of effect on the industrial landscape type in section 3.
- 11.5.127 Three of the AGIs are situated within modern fields and two of these are located within existing boundaries of individual fields and will not alter the field shape or pattern. The proposed Pump Facility to the north of Easington has a much larger footprint and will see the permanent removal of a field boundary and will change the field structure in this area. These AGIs will also introduce a permanent industrial element to this landscape type and will slightly alter the contribution it has to the legibility of the modern farming landscape.

- 11.5.128 As a result, there will be a **low** magnitude of impact from Project operation, which will have a **negligible** significance of effect on the modern field landscape type in section 3.

Future Baseline

- 11.5.129 Future changes to the baseline are anticipated to be restricted to the archaeological resource, triggered by the results of planned archaeological fieldwork on behalf of the Project, as well as other fieldwork which may take place by others in the Study Area. Changes in baseline may include:

- Identification through fieldwork of archaeological assets which were previously unknown; and
- Increased or decreased value of archaeological assets, as a result of an understanding of either the archaeology's rate of preservation or their evidential value displayed through excavation.

11.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance and Embedded Mitigation

- 11.6.1 The design will include embedded mitigation measures which would avoid or reduce the impact to heritage receptors. These measures are factored into the impact assessment and are presented in Table 11-12.

Table 11-12 – Embedded Mitigation

Ref	Measure	Project phase	Responsible party
CH1	Trenchless crossing via HDD or similar of major infrastructure would avoid direct physical impact to any such infrastructure which is identified as a heritage asset, within the draft Order Limits.	Design	Main Works Contractor
CH2	An oCEMP will be submitted with the DCO application and be accompanied by a Register of Commitments. The oCEMP will capture good practice construction working activities. This will include dampening down of loose material to reduce dust, traffic management practices, and waste management. This would support reducing potential impacts to the setting of heritage assets from construction related activity.	Construction	Main Works Contractor.
CH3	Routeing and siting for the Project will be sensitive. The Project will avoid and reduce, as far as practicable, effects on identified heritage receptors.	Design	Design team
CH4 (see Chapter 2 – 2.6.7)	Every AGI will have an associated landscape planting scheme to integrate the facility into the surrounding landscape. This would be in order to reduce potential visual impacts to the setting of heritage assets during the operation phase.	Design	Design team

11.7 Preliminary Assessment of Potential Impacts

- 11.7.1 This Section details the preliminary assessment of potential impacts for the Project during construction and operation. The decommissioning phase is scoped out of assessment within this chapter as outlined in Table 11-4.
- 11.7.2 The construction of the proposed pipeline has a limit of deviation applied, to allow flexibility of design. For the purposes of the PEIR, the limit of deviation is assumed to enable movement of the pipeline anywhere within the draft Order Limits. Therefore, a precautionary approach to assessment has been taken to assess potential impact within the whole draft Order Limits.
- 11.7.3 This chapter seeks to present a worst-case scenario, and as such any asset that is located within the draft Order Limits is considered as at risk for physical impact from construction related activities. Any asset that is directly physically impacted, resulting in a change of the asset's current state of preservation, by construction will be assumed to have been removed by this phase of works. Therefore, is not considered for assessment under operation. A refined assessment of likely impact will be presented in the ES, following further design refinement.

Construction

- 11.7.4 Impact to the Cultural Heritage resource from construction activity may have the following impacts:
- Direct physical impact resulting in the complete or partial removal of an asset from construction methods associated with either the establishment of proposed AGI structures and the proposed Pump Facility; the excavation of the trenched pipeline; the excavation associated with trenchless crossing points; and / or the location of temporary construction compounds and access roads.
 - Changes to elements of the setting of a heritage asset, where those elements contribute to the asset's significance, through either temporary works associated with construction of the pipeline, including temporary construction compounds and access roads. Works associated with proposed AGIs, where a long-term visual intrusion is being introduced to the landscape, would result in permanent impacts to the setting of a heritage asset.
 - Changes to setting may also occur from temporary access routes, which are currently in design development and not discussed here in detail.

- 11.7.5 Any physical impacts to assets of an archaeological nature (including geoarchaeological), and the historic landscape would be permanent and irreversible.
- 11.7.6 Findspots are assumed to have been removed from site as these are single finds are removed from their context by their nature. They are therefore not discussed further as they are no longer present within the Study Area.
- 11.7.7 The potential impacts for Cultural Heritage associated with the construction phase are provided in detail in Appendix 11.5, recording significance of effect before mitigation (after mitigation effects are recorded in Table 11-19). Tables 11-13 to 11-15, provide a summary of the significant effects only for each section, prior to mitigation. These are presented below.

Table 11-13 – Construction Phase – Preliminary Assessment of Potential Significant Impacts in Section 1 – Drax to the River Trent

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Designated Heritage Assets						
Scurff Hall moated site (SM3)	High	Plant movement and noise during Project undergrounding works, completely surrounded by the draft Order Limits, causing a considerable change to the rural aspect of the asset's setting. There will be a medium magnitude of impact albeit temporary.	Medium	Temporary	Adverse	Direct
Adlingfleet Conservation Area (CA3)	High	Plant movement / noise during Project undergrounding works, nearby temporary construction compound, vehicle movement for access causing a slight change to the quiet village and rural aspect of the asset's setting. There will be a low magnitude of impact albeit temporary.	Low	Temporary	Adverse	Direct
Other Heritage Assets						
Moat, Long Drax (9)	High	Temporary changes to setting due to loss of historic agricultural context.	Medium	Temporary	Adverse	Direct
Geophysical remains of a possible trackway (12)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Fishpond south of Drax Abbey Farm (14)	High	Temporary changes to setting due to visual and audible disruption from construction machinery in a quiet agricultural landscape	Medium	Temporary	Adverse	Direct
Possible enclosure or moated site, Drax (19)	Medium	Partial removal by direct impact	Medium	Permanent	Adverse	Direct
St Wilfreds (59)	Medium	Total removal by direct impact	High	Permanent	Adverse	Direct
Hawday Lane (66)	Low	Total removal by direct impact	High	Permanent	Adverse	Direct
Iron Age / Roman features South of Halfway Houses, Newland (70)	Low	Total removal by direct impact	High	Permanent	Adverse	Direct
Roman Enclosures Underlying A Medieval Boundary (77)	Medium	Total removal by direct impact	High	Permanent	Adverse	Direct
Possible Extraction Ditches / pits (106)	Low	Total removal by direct impact	High	Permanent	Adverse	Direct
Cropmarks, West Ings (131)	Low	Total removal by direct impact	High	Permanent	Adverse	Direct
Decoy House (site of) (167)	Low	Total removal by direct impact	High	Permanent	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Site of Bracken Hill Cross (169)	Low	Total removal by direct impact	High	Permanent	Adverse	Direct
Warping drain (site of) Keadby Common (170)	Low	Total removal by direct impact	High	Permanent	Adverse	Direct
Adlingfleet Med / pm Settlement & Smv (194)	Medium	Temporary changes to setting due to visual and audible disruption from construction machinery in a quiet agricultural landscape.	Medium	Temporary	Adverse	Direct
Possible Prehistoric or Romano-British Settlement (1821)	Medium	Total removal by direct impact	High	Permanent	Adverse	Direct
Possible Prehistoric or Romano-British Settlement (1822)	Medium	Total removal by direct impact	High	Permanent	Adverse	Direct

Table 11-14 Construction phase – preliminary assessment of potential significant impacts in Section 2 – River Trent to River Humber

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Designated Heritage Assets						
Thornton Abbey Augustinian monastery: gatehouse, precinct, medieval road and bridge, moat, fishponds, post-Dissolution college and school, and house (SM14)	High	Plant movement and noise, increased vehicle movement and noise for access during the Project undergrounding works, construction of an AGI, two trenchless crossing compounds, a permanent access track and two HDD sections are all in very close proximity. The draft Order Limits are adjacent to the asset to the north and east, and viewpoint visualisations (East Halton 1, 2 and 3) indicate limited screening and that the AGI location will be visible within the surrounding countryside and in open views from / to the asset. This will cause a considerable change in the asset's immediate and wider rural setting.	Medium	Temporary	Adverse	Direct
Roman villa immediately west of Horkstow Hall (SM7)	High	Plant movement and noise, increased traffic along road, trenchless crossing compound nearby, causing a slight change to the asset's wider rural setting. Works would damage associated contemporaneous undesignated assets (485) with which the asset has a historic relationship in its setting.	Medium	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Medieval Settlement of Croxton (SM12)	High	Plant movement and noise, increased traffic along road, AGI construction and temporary construction compound nearby. Viewpoint visualisations (Croxton 1 and 2) indicate limited screening and that the AGI will be somewhat visible in open views from the asset to the surrounding countryside. This will cause a slight change to the asset's rural setting.	Medium	Temporary	Adverse	Direct
Yarborough Camp large univallate hillfort (SM10)	High	Plant movement and noise, increased traffic along road and an AGI construction nearby. Viewpoints indicate limited screening from the removal of the woodland on the SM and that the draft Order Limits will be visible in open views towards the asset. This will cause a slight change to the asset's wider rural setting and affect the wide landscape views which contributes to the asset significance, although the view of a quarry directly west of the asset has reduced this significance.	Medium	Temporary	Adverse	Direct
North Garth moated site and associated enclosures (SM18)	High	Plant movement and noise, increased vehicle movement and noise for access during Project undergrounding works, construction of an AGI, trenchless crossing compound and HDD section are nearby. The draft Order Limits are adjacent to the asset to the north and east, and viewpoint visualisations (Killingholme 1 and 2) indicate that the AGI construction will be visible within the assets setting and cumulatively add to the impact of the existing industrial development to the east. The works will damage associated assets (1124, 1187), affecting the assets historic setting and historic relationships.	Medium	Temporary	Adverse	Direct
Roman Settlement (SM11)	High	Plant movement and noise, increased traffic along road, AGI construction and temporary construction compound nearby, causing a slight change to the asset's setting.	Low	Temporary	Adverse	Direct
Thornton Abbey Gatehouse and Wing Walls, Precinct Walls and Barbican (LB88)	High	Plant movement and noise, AGI construction nearby, two trenchless crossing compounds nearby, permanent access track nearby, two HDD sections nearby, and increased traffic and vehicle movement for access during Project undergrounding works, may each cause a noticeable change in the asset's wider rural setting.	Low	Temporary	Adverse	Direct
Manor Farm Moated Site (SM19)	High	Plant movement and noise, increased traffic and vehicle movement for access during Project undergrounding works, AGI construction, HDD section and trenchless crossing compound nearby. The draft Order Limits are adjacent to the asset to the	Low	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		north, east and south and viewpoint visualisations (Killingholme 1 and 2) indicate that the AGI construction works will be visible within the assets setting and cumulatively add to the impact of the existing industrial development to the east. This will cause a visual and audible change in the asset's rural setting but will not disrupt the asset's relationships with its associated listed buildings.				
Manor Farmhouse (LB98)	High	Plant movement and noise, AGI construction works and trenchless crossing compound nearby, and increased traffic and vehicle movement for access during Project undergrounding works. The draft Order Limits are adjacent to the asset to the north and east, viewpoint visualisations (Killingholme 1 and 2) indicate that the AGI construction will be visible within the assets setting and cumulatively add to the impact of the existing industrial development to the east. This will cause a noticeable change in the asset's rural setting.	Low	Temporary	Adverse	Direct
Horkstow Hall (LB65)	High	Plant movement and noise, increased traffic along road, trenchless crossing compound nearby, causing a slight change to the asset's rural setting. Thick, mature vegetation prevents intervisibility between the hall and Project undergrounding works.	Low	Temporary	Adverse	Direct
Remains of Thornton Abbey Church and Adjoining Monastic Ranges (LB93)	High	Plant movement and noise, increased traffic and vehicle movement for access during Project undergrounding works, AGI construction nearby, two trenchless crossing compounds nearby, permanent access track nearby and two HDD sections, causing a noticeable change in the asset's wider rural setting.	Low	Temporary	Adverse	Direct
Wooton Hall and adjoining screen wall (LB77)	High	Plant movement and noise, increased vehicle movement in the area for access during Project undergrounding works, causing a slight change in the asset's rural setting. Mature planted trees around the grounds of the hall screen views towards Project undergrounding works.	Low	Temporary	Adverse	Direct
Church of St Peter (LB97)	High	Plant movement and noise, increased traffic and vehicle movement for access during Project undergrounding works, nearby trenchless crossing compound and AGI construction works. Viewpoint visualisations (Killingholme 1 and 2) indicate that the AGI construction works will be visible within the assets setting and cumulatively add to the impact of the existing	Low	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		industrial development to the east. This will cause a slight change in the asset's wider rural setting.				
Heavy Anti-aircraft gunsite (SM6)	High	Plant movement and noise, increased traffic and vehicle movement for access during Project undergrounding works, AGI construction works, temporary construction compound and trenchless crossing compound nearby, causing a slight change in the asset's rural setting.	Low	Temporary	Adverse	Direct
Long barrow, two Neolithic mortuary enclosures and adjacent round barrow (SM8)	High	Plant movement and noise, increased traffic along road, trenchless crossing compound and AGI construction works nearby. Viewpoint visualisations (Barrow 1, 2, 3 and 4) indicate that the AGI construction will be visible within open view to and from the asset. This will cause a slight change to the asset's wider rural and open setting.	Low	Temporary	Adverse	Direct
Howe Hill Bowl Barrow (SM9)	High	Plant movement and noise, increased traffic along road, causing a slight change to the asset's rural setting.	Low	Temporary	Adverse	Direct
Second World War QF bombing decoy (SM15)	High	Plant movement and noise, increased traffic along road, HDD section and trenchless crossing compound nearby. The draft Order Limits adjacent to the asset causing a slight change to the asset's rural setting.	Low	Temporary	Adverse	Direct
Chapel Farmhouse (LB69)	High	Plant movement and noise, increased traffic and vehicle movement for access during Project undergrounding works, and nearby trenchless crossing compound causing a noticeable change in the asset's rural setting.	Low	Temporary	Adverse	Direct
Barton Lodge (LB71)	Medium	Plant movement and noise, increased traffic and vehicle movement for access during Project undergrounding works, and AGI construction works nearby. Viewpoint visualisations (Barrow 1, 2 and 3) indicate the AGI works will be visible within the assets wider setting. This will cause a slight change in the asset's rural setting.	Medium	Temporary	Adverse	Direct
Farmhouse and Barn at Barton Field Farm (LB70)	Medium	Plant movement and noise, increased traffic and vehicle movement for access during Project undergrounding works, and nearby trenchless crossing compound causing a noticeable change in the asset's rural setting.	Medium	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Glebe Farmhouse (LB51)	Medium	Plant movement and noise, increased traffic along road, clear views to Project undergrounding works in fields directly south of the asset, causing a change to the asset's rural setting.	Medium	Temporary	Adverse	Direct
Hall Farm Cottages (LB64)	Medium	Plant movement and noise, increased traffic along road, trenchless crossing compound nearby, causing a slight change to the asset's rural setting.	Medium	Temporary	Adverse	Direct
Other Heritage Assets						
Former St James' Hospital (805), Thornton Abbey and Precinct (832), Thornton Abbey fishponds (836), Possible Fishponds north of Thornton Abbey (796)	High	Temporary changes to setting due to loss of historic rural context of Thornton Abbey.	Low	Temporary	Adverse	Direct
Haythby Deserted Medieval Village (244), Late Prehistoric Cropmark Complex (272, 278, 341, 377), Possible Ladder Settlement (309), Romano-British settlement (485, 636), 'Blow Field' Moated site (1178), Roman Settlement South of Westfield Farm (1183), Prehistoric settlement (1848)	Medium	Removal in whole by direct impact.	High	Permanent	Adverse	Direct
Romano-British settlement cropmarks (350, 353, 359), Thornton Curtis Settlement earthworks (684), North Killingholme settlement earthworks (1124)	Medium	Partial removal by direct impact.	Medium	Permanent	Adverse	Direct
Hall Farm Horkstow (492), Former stable block Horkstow Hall (491)	Medium	Temporary changes to setting due to increase in volume of construction traffic and noise within a quiet rural setting.	Medium	Temporary	Adverse	Direct
Barton Lodge Landscape Garden (565), Croxton Medieval / Post-Medieval settlement (682), Hotlham Deserted Medieval Village (1175)	Medium	Temporary changes in setting due to removal of agricultural hinterland which informs the historic setting of the asset.	Medium	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Excavated Romano-British Settlement (575)	Medium	Temporary changes to setting due to loss of historic rural context	Medium	Temporary	Adverse	Direct
RAF Dispersed Site 4 (1202), RAF Dispersed Site 5 (1192), RAF Dispersed Site 6 (1121)	Low	Removal in whole by direct impact.	High	Permanent	Adverse	Direct
Roman Enclosure 440m north east of Glebe Farm (1336), Possible Roman enclosures (1365), Roman Pottery in Immingham (1428), Possible Roman Settlement Immingham (1435)	Low	Removal in whole by direct impact.	High	Permanent	Adverse	Direct
Possible Settlement Site, Winterton Ings (428)	Low	Removal in whole by direct impact.	High	Permanent	Adverse	Direct
Rectilinear cropmark enclosures (1820)	Low	Removal in whole by direct impact.	High	Permanent	Adverse	Direct
Site of un named farmstead (802), enclosure NE of Thornton Abbey (845), Ditches and Pits West of Ash Tree Farm (931), Cropmarks North of Rye Hill Plantation (946), Three Ring Ditches (975), Roman Enclosure in Habrough (990)	Low	Removal in whole by direct impact.	High	Permanent	Adverse	Direct

Table 11-15 – Construction Phase – Preliminary Assessment of Potential Significant Impacts in Section 3 – River Humber to Easington

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Designated Heritage Assets						
Paull Holme Moated Site & Tower (SM23)	High	Plant movement and noise, increased vehicle movement and traffic during Project undergrounding works, HDD section, the construction of an AGI with permanent access track, and three trenchless crossing compounds in the	Medium	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		area. The setting of the asset is on a south facing slope above the flats of Paull Holme, partially screened by trees bordering the moat. The general character of the setting is coastal and rural, surrounded by open fields to the north, east and south, with views to the sea to its west, contributing to the assets value. The draft Order Limits surround the asset in all directions. This will cause a considerable change to the asset's rural setting. Associated archaeological deposits may be present in the immediate surroundings of the asset which may be impacted by the works.				
Winestead Manor moated site (SM23)	High	Plant movement and noise, increased traffic and vehicle movement during Project undergrounding works, two trenchless crossing compounds and a temporary construction compound nearby. The asset sits on a slight rise in the surrounding quiet agricultural landscape, some trees in the moat provide limited visual screening. The draft Order Limits are adjacent to the asset to the south, east and west causing a slight change to the asset's rural setting.	Medium	Temporary	Adverse	Direct
Winestead Conservation Area (CA5)	High	Plant movement and noise, increased traffic and vehicle movement during Project undergrounding works, two trenchless crossing compounds and a temporary construction compound nearby. The asset is situated in a largely quiet and rural agricultural environment. The draft Order Limits are adjacent to the asset to the south and southeast causing a noticeable change to the asset's rural setting.	Low	Temporary	Adverse	Direct
Paull Holme Tower (LB112)	High	Plant movement and noise, increased vehicle movement and traffic during Project undergrounding works, HDD section, the construction of an AGI with permanent access tack, and three trenchless crossing compounds in the area. The setting of the asset is both rural and coastal and surrounded by the reclaimed open fields to the north, east and south with views to the Humber to its west and this contributes to the assets value. The draft Order Limits surround the asset in all directions. This will cause a	Medium	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		significant change to the asset's setting and there will be a medium magnitude of impact.				
Church of St Germain (LB121)	High	Plant movement and noise, increased traffic and vehicle movement during Project undergrounding works, two trenchless crossing compounds and a temporary construction compound nearby. The church sits on a slight rise in the surrounding quiet agricultural landscape, screened on all sides by trees. The draft Order Limits are adjacent to the asset to the south, east and west causing a noticeable change to the asset's rural setting.	Medium	Temporary	Adverse	Direct
The Hall (LB113)	Medium	Plant movement and noise, increased vehicle movement and traffic during Project undergrounding works, HDD section, construction of the AGI, and three trenchless crossing compounds in the area. The Hall sits on a hill above a rural agricultural landscape. The draft Order Limits are adjacent to the asset to the south and west, causing a noticeable change to the asset's rural setting particularly to the west and southwest where some minor breaks in screening occur.	Medium	Temporary	Adverse	Direct
Other Heritage Assets						
Dimlington Stadial Deposits at the Easington Landfall (1854)	High	Partial removal by direct impact.	High	Permanent	Adverse	Direct
Rectilinear Field System (1706), Ring Ditches, Numbers (1710), Linear Ditches, North of Whin Hill (1714), Rectangular Enclosures, Winestead Carrs (1715), Cropmarks, North Field (1754)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
St Mary Magdalene's Leper Hospital & Moat, W Of Newton Garth (1526), Medieval Leper Hospital and Moat, Newton Garth, Paull (1530)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
Decoy, S of Paull Holme (1581), Second World War Bombing Decoy Site, Paull (1595), Second World War Bombing Decoy Site, Paull (1599)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
Shrunken Medieval Village, Ridge And Furrow, Paul Holme, Paull (1584), Paull Holme Med / pm Settlement & Smv (1588)	Medium	Temporary changes to setting during construction phase due to the removal of agricultural hinterland which informs the historic setting of the village. The visual and audible	High	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		disruption from construction machinery within this quiet, agricultural landscape, will also be a temporary change.				
Site of Old Park, Winestead (1701)	Medium	Temporary changes to setting during construction phase due to the removal of agricultural hinterland and loss of historic landscape context which informs the historic setting of the asset. The visual and audible disruption from construction machinery within this quiet, agricultural landscape, will also be a temporary change.	High	Temporary	Adverse	Direct
Rectangular And Circular Cropmarks, Patrington (1741), Double-ditched Feature & Other Cm, S Of Ring Of Bright Water (1742)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
Cropmarks (1769)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
Moated Site and Fishpond, Rysome Garth (1778)	Medium	Temporary changes to setting during construction phase due to the removal of agricultural hinterland and loss of historic landscape context which informs the historic setting of the asset. The visual and audible disruption from construction machinery within this quiet, agricultural landscape, will also be a temporary change.	Medium	Temporary	Adverse	Direct
Probably later prehistoric enclosures and field system (1836)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
Probably later prehistoric features (1837)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
Linear and curvilinear features, and ring ditches (1842)	Medium	Total removal by direct impact.	High	Permanent	Adverse	Direct
Second World War Bomb Crater, Paull (1386), Second World War Bomb Crater, Paull (1451)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Historic Ridge And Furrow, Newton Garth, Paull (1473), Historic Ridge And Furrow, Lakes Farm, Paull (1545), Historic Ridge and Furrow, Boreas Hill Farm, Paull (1575), Historic Field Boundaries, Cow Hill, Paull (1578), Historic Ridge and Furrow, Boreas Hill Farm, Paull (1586), Possible Historic Field Boundaries And Drainage Ditches; Settlement?, Paull Holme Paull (1596), Possible Historic Drainage Ditches, Auster Grange, Paull (1603), Medieval Broad Ridge and Furrow, Paul Holme, Paull (1607)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Site Of Aircraft Obstruction (1538), World War II Anti Landing Obstruction, Paull Holme Outstray, Paull (1554), Wwii Decoy (1597), Second World War Bombing Decoy Site, Paull Holme, Paull (1598), Site Of Decoy, Se Of Paull Holme (1599), Second World War Bomb Craters, Paull Holme, Paull (1600), Second World War Bomb Crater, Little Humber, Paull (1601), Possible Historic Drainage Ditches, Auster Grange, Paull (1603), Possible Second World War Bomb Crater, Little Humber, Paull (1613), Possible Second World War Bomb Crater, Little Humber, Paull (1615), Possible Second World War Bomb Crater, Auster Grange, Paull (1618), Possible Second World War Bomb Craters, Little Humber, Paull (1628), Possible World War II Anti-landing Obstacle, Thorn Marsh Farm, Thorngumbald (1631)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Paull Holme Shrunk Medieval Village activity Possible Historic Drainage Ditches, Paull Holme, Paull (1540), Historic Ridge And Furrow, Newton Garth, Paull (1548), Probable Post Medieval Drainage Ditches, Paull Holme Outstray, Paull (1549), Possible Historic Drainage Ditch, Paull Holme, Paull (1552), Medieval Broad Ridge And Furrow, Paul Holme, Paull (1560), Well At Paull Holme Farm (1562), Possible Historic Field Boundaries, Paull Holme, Paull (1580), Possible Historic Field Boundary, Paull Holme, Paull (1582), Historic Drainage Ditches, Settlement, Paull Holme, Paull (1583), Post Medieval To Early Twentieth Century Land Improvement Drain, Thorney Crofts, Thorngumbald (1635)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Possible Post Medieval Sea Defences, Paull Holme Outstray, Paull (1565)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Paull Holme Farmhouse (1566)	Low	Temporary changes to setting during the construction phase due to a lack of screening around the asset which allows for wide-ranging views of the estuary landscape including views of the construction works.	High	Permanent	Adverse	Direct
Possible Pit Alignment, North West of Boreas Hill (1570)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Post Medieval Gravel Hill, South Hill, Paull (1602), Historic Field Boundaries, Little Humber, Paull (1611), Possible	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Historic Pond and Trackway, Thorn Marsh Farm, Thorngumbald 1627)						
Site of Direction Finder Station (1634)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Ryhill Marsh Enclosure (1638)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Disused Field Boundaries with Corner Fold (1666)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
? round Barrows, N of Ings Lane (1700)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Possible Prehistoric Occupation (1702)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Prehistoric to Medieval Features and Finds (1712)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Rectilinear Enclosures, Linear Features And Field Boundaries (1771)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Possible Cropmarks (1824)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Additional Field Boundary (1826)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Control Room Bunker (1827)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Former field drain (1831)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Possible prehistoric features (1838)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Possible prehistoric enclosures (1839)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Ring ditch and possible trackway (1843)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Ring ditch and linear features (1846)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct
Linear and Curvilinear Features (1840)	Low	Total removal by direct impact.	High	Permanent	Adverse	Direct

Operation

- 11.7.8 Most impacts from construction are not expected to be carried forward into operation. Where a heritage asset, or any part thereof, is directly physically impacted during construction, it is expected that it will result in the removal of the asset during that phase of works. The nature of the majority of the Project, as a buried pipeline with the land to be reinstated and returned to its pre-construction state, would result in most setting impacts being limited to temporary changes during the construction phase only.
- 11.7.9 However, the Project would introduce some permanent operational changes to the landscape of the draft Order Limits, through the presence of proposed AGIs and Pump Facility. The proposed AGIs have the potential to introduce a new industrial character to the landscape, and therefore the setting of heritage assets, for those assets whose setting extends into the draft Order Limits in the vicinity of proposed AGIs. Only those assets which have the potential to have their setting changed from a proposed AGI are discussed in this section.
- 11.7.10 Impacts from dewatering, should they continue into the operational phase, have the potential to impact on sensitive organic remains of geoarchaeological and palaeoenvironmental significance and potential. This could lead to damage and decay of paleoenvironmental remains through the drying out of previously wet deposits. Further discussion on potential dewatering impacts is available in Chapter 10: Ground Conditions and Hydrogeology.
- 11.7.11 The potential impacts for Cultural Heritage associated with the operational phase are provided in detail in Appendix 11.5, recording significance of effect before mitigation (after mitigation effects are recorded in Table 11-19). Table 11-16 to Table 11-18, a summary of the significant effects only by section is presented below.

Table 11-16 – Operational Phase – Preliminary Assessment of Potential Impacts in Section 1 – Drax to River Trent

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Medieval to post-Medieval fish pond (7)	High	This asset is outside of the draft Order Limits and its setting is assessed to extend to the Project. The draft AGI is located 210 m southeast of the Scheduled complex. There may partial intervisibility between the asset and AGI, causing visual disruption in the rural setting of the asset.	Low	Permanent	Adverse	Direct
Moat, Long Drax (9)	High	This asset is outside of the draft Order Limits and its setting is assessed to extend to the Project. The draft AGI is located 210 m southeast of the Scheduled complex. There may partial intervisibility between the asset and AGI, causing visual disruption in the rural setting of the asset.	Low	Permanent	Adverse	Direct

Table 11-17 – Operational Phase – Preliminary Assessment of Potential Impacts in Section 2 – River Trent to River Humber

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Yarborough Camp large univallate hillfort (SM10)	High	The Project will introduce an AGI in the area. Viewpoints indicate limited screening from the removal of the woodland on the SM and that the AGI will be somewhat visible in open views towards the asset, which will cause a very minor change to the asset's rural setting, as part of the asset's significance is from its position on a hill with open views. A quarry to the near south-west of the hillfort, however, reduces the contribution of the setting to the asset's significance.	Low	Permanent	Adverse	Direct
Thornton Abbey Augustinian monastery: gatehouse, precinct, medieval road and bridge, moat, fishponds, post-Dissolution college and school, and house (SM14)	High	The Project will introduce an AGI within the setting of the asset. Viewpoint visualisations (East Halton 1, 2 and 3) indicate limited screening and that the AGI will be visible within the surrounding countryside and in open views from / to the asset, as well as traffic noise from the permanent access road which will cause noticeable visual and noise disruption to the asset's wider rural setting.	Medium	Permanent	Adverse	Direct

Table 11-18 – Operational Phase – Preliminary Assessment of Potential Significant Impacts in Section 3 – River Humber to Easington

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Paull Holme Tower (LB112)	High	The Project will introduce an AGI and permanent access track within the setting of the asset, and viewpoint visualisations (Thorngumbald 1, 2 and 3) indicate that the AGI will be visible within open views of the asset. This will cause a noticeable change to the asset's open and rural setting and there will be a low magnitude of impact.	Low	Permanent	Adverse	Direct
Paull Holme moated site and tower (SM21)	High	The Project will introduce an AGI and permanent access track within the setting of the asset, and viewpoint visualisations (Thorngumbald 1, 2 and 3) indicate that the AGI will be visible within open views of the asset. This will cause a slight change to the asset's open and rural setting.	Low	Permanent	Adverse	Direct
World War II decoys for Hull docks, 1580m south east, 600m west and 90m south west of Little Humber (SM22)	High	The Project will introduce an AGI and permanent access track within the setting of the asset, viewpoint visualisations (Thorngumbald 1, 2 and 3) indicate that the AGI will be visible within open views of the asset, however the asset is only partly located within the 500m buffer zone. This will cause a slight change to the asset's rural setting and there will be a low magnitude of impact.	Low	Permanent	Adverse	Direct
Old Little Humber moated site (SM25)	High	The Project will introduce an AGI and permanent access track within the setting of the asset, viewpoint visualisations (Thorngumbald 1, 2 and 3) indicate that the AGI will be visible within open views of the asset. This will cause a slight change to the asset's rural setting and there will be a low magnitude of impact.	Low	Permanent	Adverse	Direct

Decommissioning

- 11.7.12 It has been decided that decommissioning impacts could be scoped out of the EIA and will not be reported in the ES, as decommissioning is unlikely to result in significant effects to the Cultural Heritage resource. (ID 3.7.5),

11.8 Additional Mitigation and Enhancement Measures

- 11.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 11.7.

Construction

Below Ground Archaeological Remains

- 11.8.2 This chapter has presented a worst-case scenario for potential impacts by considering any asset within the draft Order Limits for direct physical impact, to account for the limit of deviation to the pipeline route.
- 11.8.3 This section will focus on secondary mitigation for archaeological remains which would seek to reduce impact. This would be through a form of archaeological excavation and recording (to be defined in the outline mitigation strategy). Reduction in impact would be achieved by preventing the loss of any archaeological information, with proper study and allowing the archaeological remains to be understood individually and within a wider context. This understanding can subsequently be communicated to the wider public via reporting and deposition within the relevant Historic Environment Record. However, it is acknowledged that EN-1 paragraph 5.9.30 (Ref 11.3) notes that our ability to record an asset is not adequate mitigation of any harm. Consequently, no change in magnitude of impact, from those reported in Section 11.7 would be achieved.
- 11.8.4 Impacts from dewatering of sensitive organic remains of archaeological significance, could be managed via a suitable drainage design to mitigate changes in hydrology (Chapter 18: Hydrology and Land Drainage).

Changes to setting

- 11.8.5 The majority of construction impacts would result from changes to an asset's setting, which contributes to its significance. This would be temporary, until the pipeline is laid, and the land reinstated to agricultural land. No further mitigation

is proposed at construction, further to the embedded good practice of construction activity.

Operation

- 11.8.6 Operational mitigation would be focused on reducing the visual intrusion of proposed AGI infrastructure and proposed Pump Facility on the surrounding landscape. The footprint of proposed AGIs allow for an area of landscaping, where required to mitigate potential visual intrusion and screen the infrastructure, to maintain the overall green landscape.
- 11.8.7 This mitigation is outlined and considered in the significant effects tables presented in section 11.9 and construction effects in Appendix 11.5.

Decommissioning

- 11.8.8 Assessment of decommissioning impacts has been scoped out of the Cultural Heritage assessment as per Scoping Opinion ID 3.7.5.

11.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 11.9.1 Table 11-19 below summarises the preliminary assessment of potential significant effects associated with the Project.
- 11.9.2 Please note that for physical impacts to archaeology, although the mitigation states ‘preservation by record’, that this will not act to reduce the degree of impact or by extension the significance of effect in line with EN-1 (Ref 11.3) guidance, outlined in section 11.8.

Table 11-19 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Scurff Hall moated site (SM3)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Adlingfleet Conservation Area (CA3)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Moat, Long Drax (9)	High	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Geophysical remains of a possible trackway (12)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Fishpond south of Drax Abbey Farm (14)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Possible enclosure of moated site, Drax (19)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
St Wilfreds (59)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Hawday Lane (66)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Iron Age / Roman features South of Halfway Houses, Newland (70)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Roman Enclosures Underlying A Medieval Boundary (77)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Possible Extraction Ditches / Pits (106)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Cropmarks, West Ings (131)	High	Construction	Direct physical contact	Permanent	Preservation by record	Moderate Adverse
Decoy house (site of) (167)	Low	Construction	Direct physical contact	Permanent	Preservation by record	Moderate Adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Site of Bracken Hill Cross (169)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Warping drain (site of) Keadby Common (170)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Adlingfleet Med / pm Settlement and Smv (194)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Possible Prehistoric or Romano-British settlement (1821)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Possible Prehistoric or Romano-British Settlement (1822)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Thornton Abbey Augustinian monastery: gatehouse, precinct, medieval road and bridge, moat, fishponds, post-Dissolution college and school, and house (SM14)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Roman villa immediately west of Horkstow Hall (SM7)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Medieval Settlement of Croxton (SM12)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Yarborough Camp large univallate hillfort (SM10)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
North Garth moated site and associated enclosures (SM18)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary & Permanent	Standard construction mitigation measures as outlined in draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect and the permanent loss of contemporaneous assets will result in a permanent significant effect.

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Thornton Abbey Gatehouse and Wing Walls, Precinct Walls and Barbican (LB88)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Manor Farmhouse (LB98)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Remains of Thornton Abbey Church and Adjoining Monastic Ranges (LB93)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Church of St Peter (LB97)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Long barrow, two Neolithic mortuary enclosures and adjacent round barrow (SM8)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Howe Hill Bowl Barrow (SM9)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Second World War QF bombing decoy (SM15)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Chapel Farmhouse (LB69)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Barton Lodge (LB71)	Medium	Construction	Change in setting which adversely	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
			affects the heritage value of the asset			loss of the rural setting will still result in a temporary significant effect.
Farmhouse and Barn at Barton Field Farm (LB70)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Glebe Farmhouse (LB51)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Hall Farm Cottages (LB64)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Former St James' Hospital (805), Thornton Abbey and Precinct (832), Thornton Abbey fishponds (836), Possible Fishponds north of Thornton Abbey (796)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Haythby Deserted Medieval Village (244), Late Prehistoric Cropmark Complex (272, 278, 341, 377), Possible Ladder Settlement (309), Romano-British settlement (485, 636), 'Blow Field' Moated site (1178), Prehistoric settlement (1848)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Romano-British settlement cropmarks (350, 353, 359), Thornton Curtis Settlement earthworks (684), North Killingholme settlement earthworks (1124)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Hall Farm Horkstow (492), Former stable block Horkstow Hall (491) (575)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Barton Lodge Landscape Garden (565), Croxton Medieval / Post-Medieval settlement (682), Holtham Deserted Medieval Village (1175)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Excavated Romano-British Settlement (575)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Thornton Abbey Augustinian monastery: gatehouse, precinct, medieval road and bridge, moat, fishponds, post-Dissolution college and school, and house (SM14)	High	Operation	Change in setting which adversely affects the heritage value of the asset	Permanent	Embedded mitigation of landscape planting will act to reduce the visual impact of the AGI in the setting of the asset	Moderate adverse – The AGI planting scheme will reduce views towards the AGI, but the permanent access road will cause traffic noise, disrupting the rural setting and resulting in a permanent significant effect.
Paull Holme Moated Site & Tower (SM23)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting and disruption of wider views from the asset will still result in a temporary significant effect.
Winestead Manor moated site (SM23)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Winestead Conservation Area (CA5)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Paull Holme Tower (LB112)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting and disruption of wider views from the asset will still result in a temporary significant effect.
Church of St Germain (LB121)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
The Hall (LB113)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Dimlington Stadial Deposits at the Easington Landfall (1854)	High	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Rectilinear Field System (1706), Ring Ditches, Numbers (1710), Linear Ditches, North of Whin Hill (1714), Rectangular Enclosures, Winestead Carrs (1715), Cropmarks, North Field 1754)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
St Mary Magdalene's Leper Hospital & Moat, W Of Newton Garth (1526), Medieval Leper Hospital and Moat, Newton Garth, Paull (1530)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Decoy, S of Paull Holme (1581), Second World War Bombing Decoy Site, Paull (1595), Second World War Bombing Decoy Site, Paull (1599)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Shrunken Medieval Village, Ridge and Furrow (1584), Paull Holme Med / pm Settlement & SMV (1588)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Site of Old Park, Winestead (1701)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Rectangular And Circular Cropmarks, Patrington (1741), Double-ditched Feature & Other Cm, S Of Ring Of Bright Water (1742)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Cropmarks (1769)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Moated Site and Fishpond, Rysome Garth (1778)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures as outlined in the draft CEMP.	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting and removal of agricultural hinterland within the wider setting will still result in a temporary significant effect.
Probably later prehistoric enclosures and field system (1836)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Probably later prehistoric features (1837)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Linear and curvilinear features, and ring ditches (1842)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Second World War Bomb Crater, Paull (1386), Second World War Bomb Crater, Paull (1451)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Historic Ridge And Furrow, Newton Garth, Paull (1473), Historic Ridge And Furrow, Lakes Farm, Paull (1545), Historic Ridge and Furrow, Boreas Hill Farm, Paull (1575), Historic Field Boundaries, Cow Hill, Paull (1578), Historic Ridge and Furrow, Boreas Hill Farm, Paull (1586), Possible Historic Field Boundaries And Drainage Ditches; Settlement?, Paull Holme Paull (1596), Possible Historic Drainage Ditches, Auster Grange, Paull (1603), Medieval Broad Ridge and Furrow, Paul Holme, Paull (1607)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Site Of Aircraft Obstruction (1538), World War II Anti Landing Obstruction, Paull Holme Outstray, Paull (1554), Wwii Decoy (1597), Second World War Bombing Decoy Site, Paull Holme, Paull (1598), Site Of Decoy, Se Of Paull Holme (1599), Second World War Bomb Craters, Paull Holme, Paull (1600), Second World War Bomb Crater, Little Humber, Paull (1601), Possible Historic Drainage Ditches, Auster Grange, Paull (1603), Possible Second World War Bomb Crater, Little Humber, Paull (1613), Possible Second World War Bomb Crater, Little Humber, Paull (1615), Possible Second World War Bomb Crater, Auster Grange, Paull (1618), Possible Second World War Bomb Craters, Little Humber, Paull (1628), Possible World War II Anti-landing Obstacle, Thorn Marsh Farm, Thorngumbald (1631)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Paull Holme Shrunk Medieval Village activity Possible Historic Drainage Ditches, Paull Holme, Paull (1540), Historic Ridge And Furrow, Newton Garth, Paull (1548), Probable Post Medieval Drainage Ditches, Paull Holme Outstray, Paull (1549), Possible Historic Drainage Ditch, Paull Holme, Paull (1552), Medieval Broad Ridge And Furrow, Paul Holme, Paull (1560), Well At Paull Holme Farm (1562), Possible Historic Field Boundaries, Paull Holme, Paull (1580), Possible Historic Field Boundary, Paull Holme, Paull (1582), Historic Drainage Ditches,	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Settlement, Paull Holme, Paull (1583), Post Medieval To Early Twentieth Century Land Improvement Drain, Thorney Crofts, Thorngumbald (1635)						
Possible Post Medieval Sea Defences, Paull Holme Outstray, Paull (1565)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Paull Holme Farmhouse (1566)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible Pit Alignment, North West of Boreas Hill (1570)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Post Medieval Gravel Hill, South Hill, Paull (1602), Historic Field Boundaries, Little Humber, Paull (1611), Possible Historic Pond And Trackway, Thorn Marsh Farm, Thorngumbald 1627)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Site of Direction Finder Station (1634)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Ryhill Marsh Enclosure (1638)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Disused Field Boundaries with Corner Fold (1666)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
?round Barrows, N of Ings Lane (1700)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible Prehistoric Occupation (1702)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Prehistoric to Medieval Features and Finds (1712)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Rectilinear Enclosures, Linear Features And Field Boundaries (1771)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible Cropmarks (1824)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Additional Field Boundary (1826)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Control Room Bunker (1827)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Former field drain (1831)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible prehistoric features (1838)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible prehistoric enclosures (1839)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Ring ditch and possible trackway (1843)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Ring ditch and linear features (1846)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Linear and Curvilinear Features (1840)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse

11.10 Next Steps

Design Development

- 11.10.1 Results of ongoing and planned fieldwork will be fed through to the design team to support further refinement and to seek opportunities to preserve archaeological remains in situ.
- 11.10.2 Work alongside other technical disciplines, such as the LVIA (Chapter 10: Ground Conditions and Hydrogeology) to further characterise changes in setting to heritage assets and develop potential mitigation measures will be ongoing and used to support the Cultural Heritage assessment presented in the ES.
- 11.10.3 The Cultural Heritage team will also look to develop and support wider Project social value goals. Conversations will support development of potential wider socio-economic (Chapter 14: Socio-economics, Tourism and Recreation) opportunities of the Project and how Cultural Heritage can support / lead certain initiatives, either during the development of the Project's assessment phase or as part of any future mitigation measures.

Engagement

- 11.10.4 Continued engagement will be undertaken with members of the Project's Heritage Working Group (HWG), established with consultees from Historic England and the respective local authority archaeological advisors and conservation officers.
- 11.10.5 Engagement will include discussion on survey scope, survey findings and design evolution.

Surveys

- 11.10.6 Geophysical surveys within the proposed pipeline working width and the respective proposed AGI locations will continue. The results of geophysical surveying will be used to inform the baseline understanding of the historic environment, as well as the potential need for further evaluation fieldwork and mitigations.
- 11.10.7 Due to the presence of crops across the draft Order Limits, there may be limited availability of surveyable areas for geophysical surveys.

- 11.10.8 Geoarchaeological led boreholes will be excavated across the route to further develop the assessment presented in Appendix 11.2.
- 11.10.9 Following the results of the geoarchaeological assessment and geophysical survey results, if required, targeted trial trench evaluation may be undertaken. The scope of trial trenching will be developed in consultation with the HWG archaeological officers.
- 11.10.10 If undertaken, the available results of the trial trenching will be used to support the EIA and reported in the ES.

Further Assessment

- 11.10.11 A historic environment baseline report will be completed in draft and issued to consultees for comment through the forum of the HWG. The baseline report will include (among other information) a review of LiDAR data, being processed from models provided from the Project's commissioned aerial survey specialists.
- 11.10.12 A baseline for inter-tidal archaeology was previously compiled at the Easington landfall location only. The baseline assessment for inter-tidal archaeology is presented in Appendix 11.4 and the impact to the intertidal archaeology baseline of the Holderness Coast will be assessed alongside the assessment of impact to terrestrial archaeology.
- 11.10.13 The EIA will continue to further develop the understanding of significance of effects, in line with methodology described in this PEIR and the technical methodology note presented in Appendix 11.1. The EIA will be supported by the baseline reports, described above and results of survey.
- 11.10.14 A mitigation strategy will be developed in consultation with the Project's HWG based on the latest design and impact assessment. To allow for results of the fieldwork to inform the need for mitigation, the mitigation strategy is expected to only be finalised by the end of the examination period.

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12 Landscape and Visual

12.1 Introduction

- 12.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment on Landscape and Visual amenity. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 12.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary effects on Landscape and Visual amenity that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 12.1.3 This chapter should be read in conjunction with:
- Chapter 7: Ecology and Biodiversity, given the landscape mitigation measures will have direct influence on biodiversity conservation and Biodiversity Net Gain (BNG).
 - Chapter 11: Cultural Heritage, receptors such as publicly accessible landscapes, landscape character, the setting of listed buildings, and registered parks and gardens form an integral part of both visual and heritage. significance.
 - Chapter 14: Socio-Economics, Tourism and Recreation Health and Wellbeing because changes to landscape character and publicly accessible receptors can directly affect tourism, recreation, community well-being, and the economic value of local areas.
 - Chapter 15: Human Health and Wellbeing, given that the quality, accessibility, and character of landscapes can significantly influence physical activity, mental health, and overall community wellbeing-
 - Chapter 16: Traffic and Transport since transport infrastructure and traffic can alter landscape character, affect publicly accessible receptors, and influence the visual experience of routes and views.
 - Chapter 18: Hydrology and Land Drainage, due to the close association between some landscape receptors and water environment features (fluvial and coastal waterbodies) and the potential for overlapping embedded environmental measures.
- 12.1.4 This chapter is supported by the following figures:
- Figure 12.1 Site Location and Landscape and Visual Study Area

- Figure 12.2 ZTV Bare Earth and Viewpoint Location
- Figure 12.3 ZTV Screening Features and Viewpoint Locations
- Figure 12.4 Landscape Designations
- Figure 12.5 Landscape Character Areas
- Figure 12.6 Visual Amenity and Representative Viewpoints Plan

12.1.5 This chapter is supported by the following appendices:

- Appendix 12.1: Landscape Character Assessment
- Appendix 12.2: Viewpoint Photographs

12.2 Legislation, Policy and Guidance

Legislation

12.2.1 Legislation relevant to Landscape and Visual is detailed in Table 12-1.

Table 12-1 – Summary of Legislation relevant to Landscape and Visual Amenity Matters

Legislation	How it is considered within this PEIR
European Landscape Convention (ELC), Council of Europe (2004) (Ref 12.1)	The ELC applies to all local planning authorities within England. It states that: “The general purpose of the Convention is to encourage public authorities to adopt policies and measures at local, regional, national and international level for protecting, managing and planning landscapes throughout Europe so as to maintain and improve landscape quality and bring the public, institutions and local and regional authorities to recognise the value and importance of landscape and to take part in related public decisions.” One of its defining principles is that it applies to all landscapes, including ordinary or even degraded landscapes, as well as those that are afforded formal protection. The effect of the Project upon all landscapes is considered within this preliminary assessment and will continue to be considered during the remaining stages of its design and fully reported on in the Environmental Statement (ES).

Policy

National Planning Policy

- 12.2.2 National Planning Policy relevant to Landscape and Visual is detailed in Table 12-2.

Table 12-2 – Summary of National Planning Policy relevant to Landscape and Visual Amenity Matters

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Overarching National Policy Statement for Energy (EN-1) 2024 (Ref 12.2)		
Section 5.10 Landscape and Visual Landscape & Visual – general matters.	Landscape & Visual – general matters. 5.10.6 “Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints the aim should be to minimise harm to the landscape, providing reasonable mitigation where possible and appropriate.”	The Project will be designed sensitively, taking account of likely siting, operational and other relevant constraints; aim to minimise harm to landscape character and visual amenity; and provide reasonable mitigation where possible and appropriate. A preliminary appraisal of Landscape and Visual matters has been undertaken in this PEIR. This has allowed the demonstration of “how negative effects have been minimised and how opportunities for creating possible benefits and / or enhancements have been recognised and / or incorporated into the design, delivery and operation of the Project.” This preliminary appraisal has also considered potential effects on landscape components and visual receptors during construction (noting that these are temporary) and operation (including maintenance), as well as, where relevant, the potential for light pollution. The ES will report the full assessment of Landscape and Visual effects, including the detail of proposed mitigation and enhancement measures.
	Designated landscapes 5.10.7 “National Parks, the Broads and AONBs have been confirmed by the government as having the highest status of protection in relation to landscape and natural beauty. Each of these designated areas has specific statutory purposes. Projects should be designed sensitively given the various siting, operational, and other relevant constraints.” 5.10.8 “The duty to seek to further the purposes of nationally designated landscapes also applies when considering applications for projects outside the boundaries of these areas which may have impacts within them. In these locations, projects should be designed sensitively given the various siting, operational, and other relevant constraints. The Secretary of State should be satisfied that measures which seek to further the purposes of the designation are sufficient, appropriate and proportionate to the type and scale of the development.”	There are no National Parks or National Landscapes (NL) (previously Areas of Outstanding Natural Beauty) within the Study Area. Additionally, the Project is not considered to be within the setting of any such designations - the nearest being the Lincolnshire Wolds NL, over 9km to the south of the draft Order Limits. As such consideration of the effect of the Project on National Parks and NLs are scoped out of the Landscape and Visual amenity Impact Assessment (LVIA).
	5.10.12 “Outside nationally designated areas, there are local landscapes that may be highly valued locally. Where a local development document in England or a local development plan in Wales has policies based on landscape or waterscape character assessment, these should be paid particular attention. However, locally valued landscapes should not be used in themselves to refuse consent, as this may unduly restrict acceptable development.”	As part of this PEIR local landscapes have been identified that may be highly valued. In this PEIR a preliminary appraisal has been undertaken which has had regard to local authorities’ development plan documents that contain policies based on landscape character assessments.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	5.10.16. “The applicant should carry out a landscape and visual impact assessment and report it in the ES, including cumulative effects (see Section 4.3). Several guides have been produced to assist in addressing landscape issues.”	This PEIR has considered Landscape and Visual matters. A full LVIA, including a cumulative assessment, will be prepared and reported in the ES.
	5.10.17 “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 and local development plans in Wales.”	This PEIR has been prepared with consideration for landscape character assessments at national, regional and local levels. Further consideration of the most relevant aspects of these (and their associated studies), as a means of assessing landscape impacts of the Project, will be carried out within the LVIA. The PEIR has been prepared with regard for local authorities’ development plan documents which have policies based on landscape character assessments.
Applicant Assessment	5.10.19 The applicant should consider landscape and visual matters in the early stages of siting and design, where site choices and design principles are being established. This will allow the applicant to demonstrate in the ES how negative effects have been minimised and opportunities for creating positive benefits or enhancement have been recognised and incorporated into the design, delivery and operation of the scheme.	Landscape and Visual matters have been considered from the outset of site selection and design development. The siting of the proposed infrastructure has been informed by an iterative design process, which has sought to minimise potential adverse Landscape and Visual effects. This will continue and reported in the ES in the development of detailed landscape mitigation plans.
	5.10.20 The assessment should include the effects on landscape components and character during construction and operation. For projects which may affect a National Park, The Broads or an AONBs the assessment should include effects on the natural beauty and special qualities of these areas’.	The PEIR considered effects on Landscape and Visual components and character during construction and operation. Given the distance from the closest designated landscapes (National Landscapes), these have been scoped out of the PEIR for all phases.
	5.10.21 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 dark skies, local amenity, and nature conservation.	The PEIR considers the visibility and conspicuousness of the project during both construction and operation, including potential impacts on views, visual amenity, and light pollution effects on dark skies and local amenity.
Section 5.11 Land Use, Including Open Space, Green Infrastructure, and Green Belt	Users of Publicly accessible areas and paths 5.11.30 “Public Rights of way, National Trails, and other rights of access to land are important recreational facilities for example for walkers, cyclists and horse riders. The Secretary of State should expect applicants to take appropriate mitigation measures to address adverse effects on coastal access, National Trails, other rights of way and open access land and, where appropriate, to consider what opportunities there may be to improve or create new access. In considering revisions to an existing right of way, consideration should be given to the use, character, attractiveness, and convenience of the right of way.”	In this PEIR, public rights of way (PRoW), National Trails, public open space, open access land and promoted routes with potential intervisibility with the Project have been identified. Consideration of the current character and attractiveness of such routes and areas will be considered and reported in the ES.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) 2023 (Ref 12.3)		
Section 2	Landscape & Visual Impact Para. 2.21.24 to 2.21.26 states that “Additional considerations apply during the construction of a pipeline (which, without mitigation, can affect both landscape, visual amenity and ecology). These comprise the effects upon specific landscape elements within and adjacent to the pipeline route, such as grasslands, field boundaries (hedgerows, hedge banks, drystone walls, fences), trees, woodlands, and watercourses. There will also be temporary visual and landscape impacts caused by the need to access the working corridor and to remove flora and soil”	Preliminary consideration has been given within this PEIR to the potential impacts of the Project’s construction and operation upon landscape elements, such as grassland, field boundaries, trees, woodlands and watercourses. The inclusion of proposals to mitigate such impacts have been considered and will be included as part of the full LVIA, to be reported in the ES.
	Para 2.21.30 “The ES must include an assessment of the biodiversity and landscape and visual effects of the proposed route and of the main alternative routes considered (see Section 5.10 of EN-1).”	The PEIR considers the Landscape and Visual effects of the proposed route. Considerations of alternative routes and their Landscape and Visual constraints are covered in Chapter 3: Considerations of Alternatives.
	Para 2.21.31 “The application should also include proposals for reinstatement of the pipeline route as close to its original state as possible and take into account any requirements for agreements with the landowner to access areas for aftercare and management work. This is particularly important in designated landscapes.”	In this PEIR, the proposals for the restoration of the pipeline route have been considered with the aim of returning it as closely as possible to its original state following construction. This takes into account any necessary maintenance access and / or easements over the pipeline, which may limit the extent of full restoration. The full assessment of restoration measures and any residual effects will be reported in the ES.
National Planning Policy Framework (Ref 12.4)		
12 Achieving well-designed places	Para 135 “Planning policies and decisions should ensure that developments: • (a) will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development; • (b) are visually attractive as a result of good architecture, layout and appropriate and effective landscaping; • (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 (such as increased densities); • (d) establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit; • (e) optimise the potential of the site to accommodate and sustain an appropriate amount and mix of development (including green and other public space) and support local facilities and transport networks; and (f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users ; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.	The PEIR provides a preliminary appraisal to inform consultation and design development. The detailed mitigation design setting out measures to enhance visual attractiveness through sensitive siting, appropriate materials, and landscaping, and to ensure the Project is sympathetic to local character and landscape setting will be and reported in the ES.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
15 Conserving and enhancing the natural environment	Para 187 <i>“Planning policies and decisions should contribute to and enhance the natural and local environment by:</i> <i>a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);</i> <i>b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;</i> <i>c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;</i> <i>d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures and incorporating features which support priority or threatened species such as swifts, bats and hedgehogs;</i> <i>e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.</i>	The PEIR provides a preliminary appraisal of potential effects on valued landscapes. Detailed measures to protect and enhance landscape character and integrate visual mitigation into the Project will be reported in the ES including site-specific planting in coordination with the Chapter 7: Ecology and Biodiversity.
	Para 198 <i>“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:</i> <i>(a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life ⁷²;</i> <i>(b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and</i> <i>(c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”</i>	The PEIR provides a preliminary appraisal of potential effects on landscape character (which includes tranquillity), recognising that noise from the development may have only a minor influence on the perception of the landscape. No intrinsically dark landscapes are present within the Study Area. Detailed mitigation and design measures to minimise effects of potential noise on tranquillity will be and reported in the ES.

Local Planning Policy

- 12.2.3 Local Planning Policies relevant to Landscape and Visual Amenity matters are detailed in Table 12-3 below.

Table 12-3 – Summary of Local Planning Policy Relevant Landscape and Visual Amenity Matters

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
North Yorkshire Council (Selby District Core Strategy Local Plan (2013)) (Ref 12.5)	SP18 Protecting and Enhancing the Environment	Those elements of this policy relevant to LVIA include safeguarding landscape character and protecting distinctive landscapes and open spaces.	The PEIR has identified the key landscape characteristics, distinctive landscapes, and open spaces within the Study Area. The ES will provide detailed mitigation recommendations to help integrate the operational elements of the Project into the surrounding landscape. Particular consideration will be given to protecting more sensitive landscapes and areas with high visual amenity value.
	SP19: Design Quality	This policy emphasises that developments, such as the Project, should seek to enhance an area's identity, integrate landscaping within their design, and make efficient use of land without compromising local distinctiveness, character, or form.	The PEIR has identified the key landscape characteristics of the Study Area. The LVIA (reported in the ES) will provide preliminary mitigation recommendations to integrate the design of operational elements (such as AGIs and Pump Facility) into the surrounding landscape setting.
Selby Local Plan (Revised publication 2024) (Ref 12.6)	SG9 Design (Strategic Policy)	Development should, where appropriate, respond to its location, reflect important views and landscapes and reinforce the distinctiveness and character of the local area by having regard to the existing form, scale, density, layout), building materials and detailing.	The PEIR has considered how the development's form, scale, density, and layout align with the existing landscape context and settlement pattern. The LVIA (reported in the ES) will, where necessary, provide recommendations and mitigation proposals to enhance the integration of the development into its setting and minimize potential visual impacts. Recommendations will be provided on colour and materials proposed.
	NE4 Protecting and Enhancing Landscape Character (Strategic Policy)	Developments must promote high-quality designs that enhance the distinctive local landscape and adhere to guidelines in the latest Selby Landscape Character Assessment and Sensitivity Study.	The PEIR has considered how the Project's design can promote high-quality, landscape-sensitive outcomes that enhance the distinctive character of the local area, and its alignment with the guidelines and recommendations outlined in the latest Selby Landscape Character Assessment and Sensitivity Study. This ensures that the design respects the identified sensitivities, key characteristics, and capacity of the landscape. The LVIA (reported in the ES) will, where necessary, provide recommendations to refine the design, ensuring it contributes positively to the local landscape character and maintains the visual quality of the area.
	IC7 Public Rights of Way'	Where development may impact on a PRoW, satisfactory and alternative routes are to be provided, it goes on to state that where appropriate and viable PRoW should be enhanced making routes more attractive to users.	The PEIR has considered the potential impacts of the development on users of Public Rights of Way (PRoW) within the Study Area, including any changes to the visual experience for users. These will be assessed within the LVIA and reported in the ES.
	'NE6 Protecting and Enhancing Trees,	Appropriate replacement planting scheme agreed in writing with the LPA is to be provided where trees or hedgerows are to be removed or felled.	The ES will report on any woodland, trees or hedgerows that may need to be removed or felled as part of the Project. The LVIA will assess the potential impacts on landscape character and visual amenity of any

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
	Woodland and Hedgerows		potential loss / replacement and will be set out on Landscape Mitigation Plans.
East Riding Local Plan (adopted April 2016) (Ref 12.7)	ENV1: Integrating high quality design	Development should contribute to safeguarding and respecting the diverse character and appearance of the area through design, layout, construction and use. Design should contribute to a sense of place have regard to the specific characteristics of the wider context and character.	The PEIR has considered how the Project aligns with and complements the specific characteristics of the wider context. It has also given preliminary consideration to how the design contributes to a sense of place by reflecting the unique features, patterns, and visual qualities of the local area. The LVIA (reported in the ES) will provide a full assessment and, where necessary, recommendations to enhance the development's integration into the landscape and reinforce the distinctiveness of the site within its setting.
	ENV2: Promoting high quality landscape	Development proposals to be sensitively integrated into the landscape through retaining significant hedgerows and trees, with replacements required if removal is necessary, maintaining and enhancing woodland character where appropriate, preserving wetland and water features and protecting views of valued landscapes like flood meadows, grasslands, and coastlines. The policy references the East Riding Landscape Character Assessment as providing a description of existing local landscape character.	The PEIR has given preliminary consideration to the integration of the Project into the landscape, with a focus on retaining important hedgerows and trees wherever possible. The LVIA (reported in the ES) will provide a full assessment, referencing the East Riding Landscape Character Assessment to ensure the development aligns with the identified local landscape character and sensitivities. This will guide the design and mitigation measures to ensure the Project is well integrated into its landscape setting.
North Lincolnshire Local Development Framework Core Strategy	CS5: 'Delivering Quality Design in North Lincolnshire'	Development should be well designed and appropriate for their context and contribute to creating a sense of place. It goes on to state that design which is inappropriate to the local area or fails to maximise opportunities for improving the character and quality of the area would not be acceptable. Appropriate landscaping and planting which enhances biodiversity or geological features whilst contributing to the creation of a network of linked greenspaces across the area should be incorporated into development proposals.	The PEIR has given preliminary consideration to how the Project's design proposals align with local characteristics. The LVIA (reported in the ES), working with Project Ecologists, will consider the incorporation of appropriate landscaping and planting that enhances biodiversity features through Biodiversity Net Gain (BNG). The ES will also identify mitigation measures to reduce potential adverse impacts on Landscape and Visual receptors.
	CS16: North Lincolnshire's Landscape, Greenspace and Waterscape	Development on or adjacent to strategic and locally important spaces would not be permitted where it would result in unacceptable conflict with the function (s) or characteristic of the area. Where appropriate proposals would be required to improve the quality and quantity of accessible landscape, greenspace and waterscape and protect trees, hedgerows and historic landscapes.	The PEIR has given preliminary consideration to the potential impacts of the Project on strategic and locally important landscapes, with a focus on avoiding unacceptable conflict with the characteristics of these areas. The LVIA (reported in the ES) will provide a full assessment and, where appropriate, identify mitigation measures to ensure that the development contributes positively to the surrounding environment and does not diminish the value of locally important areas. Note there are not considered to be any strategically important landscapes within the Study Area.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Northeast Lincolnshire Local Plan (adopted 2018) (Ref 12.8)	42: Landscape	Developments should: use the District's Landscape Character Assessment to understand the landscape context and type within which the Project is located, and the relevant landscape guidelines and management strategies to be applied. It seeks preparation of proportionate landscape appraisals and accompanying landscape design schemes.	The PEIR has given preliminary consideration to the Project in relation to the District's Landscape Character Assessment to understand the landscape context and type within which it is located. It has also reviewed relevant landscape guidelines and management strategies to ensure that the design proposals align with the recommendations provided within the District's LCA. The LVIA (reported in the ES) will provide a full assessment, using a proportionate approach and supported by landscape plans showing provisional mitigation measures.

Guidance

12.2.4 The Landscape and Visual assessment has been carried out in accordance with the following guidance:

- Nationally Significant Infrastructure Projects: Advice on Good Design (2024) Achieving good design (Ref 12.9)
- Landscape Institute & Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Ref 12.10).
- Landscape Institute (2013) Technical Guidance LITGN-2024-01- Notes and Clarifications on Aspects of Guidelines for Landscape and Visual Impact Assessment Third edition (Ref 12.11).
- Natural England (2014). An Approach to Landscape Character Assessment (Ref 12.12).
- Landscape Institute (2019) Technical Guidance Note 06/19: Visual Representation of Development Proposals; (Ref 12.13).
- Landscape Institute (2019) Technical Guidance Note 02/19 Residential Visual Amenity Assessment (Ref 12.14).
- Landscape Institute (2021) Technical Guidance Note 02-21: Assessing Landscape Value Outside National Designations (Ref 12.15).
- Landscape Institute (2016) Landscape Character Assessment Technical Information Note 08/2015 (Ref 12.16)

12.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

12.3.1 A summary of relevant parts of the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined below.

Table 12-4 – Summary of Scoping Opinion relevant to Landscape and Visual Assessment Matters

Section Reference	Matter	Comments	Response
Planning Inspectorate (PINS) EIA Scoping Opinion			
ID 2.1.3	Landscaping	The ES should identify all proposed landscaping and confirm whether any is relied upon to mitigate potentially significant landscape and/or visual effects. The applicant should seek to agree the location and types of planting with relevant consultation bodies. The ES should explain and justify the assumptions made in respect of the growth rates of planting proposed to mitigation effects.	Noted The ES will identify all proposed landscaping and confirm whether any is relied upon to mitigate potentially significant landscape and / or visual effects. It will seek to agree the location and types of planting with relevant consultation bodies and justify the assumptions made in respect of plant growth rates.
ID 3.6.1	Effects upon the special qualities of the Lincolnshire Wolds National Landscape (NL), and the special qualities of potential Yorkshire Wolds NL – all phases	Given the nature of the proposed development and the intervening distances (9km and 21km, respectively) between the designated areas and the proposed development, the Inspectorate agrees that significant effects are unlikely. This matter can be scoped out of the ES.	Noted Effects upon the special qualities of the Lincolnshire Wolds NL and Yorkshire Wolds NL will be scoped out for all phases.
ID 3.6.2	Effects on the potential Lincolnshire Wolds NL extension within North Lincolnshire – all phases	The Scoping Report notes that there is no timetable for consideration of the area's potential designation and the Local Plan promoting it has been withdrawn. As such and noting that the future Yorkshire Wolds would be over 21km north-east of the proposed development, the Inspectorate agrees this matter can be scoped out of the ES.	Noted Effects on the potential Lincolnshire Wolds NL extension will be scoped out for all phases.
ID 3.6.3	Effects on the River Derwent Corridor Important Landscape Areas (ILA), Lower Derwent Valley ILA & Goole Moors ILA within the Study Area surrounding the pipeline alone – operational phase	The Inspectorate agrees with the applicant that once the pipelines have been laid and the disturbed / affected area would be reinstated, significant effects during the operational phase are unlikely. This matter can be scoped out of the ES.	Noted The Pipelines will be scoped out during Operation and Decommissioning Phases.
ID 3.6.4	Effects on the special qualities / key attributes of the 'Great	The AGLV is located 1km from the draft Order Limits surrounding a section of the proposed pipeline. Given this distance, the Inspectorate agrees that significant effects are unlikely and that this matter can be scoped out of the ES.	Noted Effects on the special qualities / key attributes of the 'Great

Section Reference	Matter	Comments	Response
	Limber and the Chalk Wolds Estates' Area of Great Landscape Value (AGLV) – all phases		Limber and the Chalk Wolds Estates' AGLV will be scoped out for all phases.
ID 3.6.5	Effects upon the special character of the Spurn Heritage Coast – all phases	The Pump Facility would be located approximately 2.77km from the Spurn Heritage Coast and is the closest element of the proposed development to the designation. The Inspectorate agrees that significant effects on the designation are unlikely and that this matter can be scoped out of the ES.	Noted Effects upon the special character of the Spurn Heritage Coast will be scoped out for all phases.
ID 3.6.6	Area surrounding the pipeline and Humber crossing construction areas alone – operational phase	The Inspectorate agrees with the applicant that once the pipelines and the Humber crossing have been laid and the disturbed / affected area would be reinstated, significant effects during the operational phase are unlikely. This matter can be scoped out of the ES.	Noted The Pipelines and Humber crossing will be scoped out during Operation and Decommissioning Phases.
ID 3.6.7	Effects on individual elements that contribute to the character of the landscape and seascape within the Study Area surrounding the pipeline, Humber crossing, AGIs and Pump Facility – operational phase	The Inspectorate agrees with the applicant that once the pipelines and the Humber crossing have been laid and the disturbed / affected area would be reinstated, significant effects during the operational phase are unlikely. This matter can be scoped out of the ES.	Noted The Pipelines and Humber crossing will be scoped out during Operation and Decommissioning Phases.
ID 3.6.8	Effects on the visual receptors wholly outside of the ZTV – all phase	The Scoping Report states that visual receptors outside the ZTV are highly unlikely to have clear views on the project. The Inspectorate agrees significant effects are unlikely and that this matter can be scoped out of the ES.	Noted Visual receptors wholly outside of the ZTV will be scoped out for all phases.
ID 3.6.9	Effects on visual receptors beyond a 1km offset from the pipeline, a 1.5km radius around AGIs, 2km around the Humber crossing	Section 10.6 states that the proposed study areas are based on professional judgement and experience of other similar schemes in the locality. The Inspectorate considers that, given the nature and scale of the proposed development, significant effects beyond the stated distances are unlikely. However, Section 10.3 of the Scoping Report states that Zone of Theoretical Visibility (ZTV) maps will be generated, and that actual visibility will be ground-truthed via fieldwork. Section 10.4 states that the ZTVs for the AGIs and Pump Facility will help identify landscape and visual receptors for these elements. Should the ZTVs identify visibility outside of proposed radii, impacts should be assessed where significant effects are likely.	Noted The ZTVs have not identified any visual receptors outside of the Study Area which could be considered significant.

Section Reference	Matter	Comments	Response
	areas and 2.5km around the Pump Facility – all phases		
ID 3.6.10	Effects on residential communities and recreational receptors (listed in section 10.10) within the Study Areas arising from the pipeline and Humber crossing – operational phase	The Inspectorate agrees with the applicant that once the pipelines and the Humber crossing have been laid and the disturbed / affected area would be reinstated, significant effects during the operational phase are unlikely. This matter can be scoped out of the ES	Noted The Pipelines and Humber crossing will be scoped out during Operation and Decommissioning Phases.
ID 3.6.11	Effects on users of the Yorkshire Wolds National Trail – all phases	The Scoping Report notes that the path is located at its closest point approximately 5.5km from the draft Order Limits. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.	Noted Effects upon users of the Yorkshire Wolds National Trail will be scoped out for all phases
ID 3.6.12	Effects on users of the Trans Pennine long distance path – all phases	The Scoping Report states that the Trail is located at its closest point approximately 900m from the site of the proposed AGI. Section 10.6 identifies a 1.5km study area for AGIs and paragraph 10.10.5 states that this receptor is scoped into the assessment. As a result, Inspectorate does not consider this matter can be scoped out as proposed in Table 10-12. The ES should include an assessment of effects on users of the Trans Pennine long distance path.	Agreed Effects upon users of the Trans Pennine Trail has been included in the PEIR and will be reported in the ES.
ID 3.6.13	Effects on users of the Viking Way long distance path – operational phase	The Viking Way crosses through the draft Order Limits, where the pipeline would be constructed. The Inspectorate considers that once the pipeline has been laid and the disturbed / affected area would be reinstated, significant effects during the operational phase are unlikely. This matter can be scoped out of the ES.	Noted Effects upon users of the Viking Way will be scoped out for all phases
ID 3.6.14	Effects on visitors to the Registered Park and Garden of Brocklesby Park – all phases	The Park lies approximately 2.8km from the nearest permanent above ground element of the Project (the Croxton AGI), and approximately 2.25km from the temporary construction works areas. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.	Noted Effects upon visitors to Brocklesby Park will be scoped out for all phases.
ID 3.6.15	People travelling by motorised vehicle – construction phase	The Scoping Report states that there are no known promoted driving routes through the Study Area. The Inspectorate agrees that as a result, and due to the speed of travel and the nature of the proposed development, significant effects on people travelling by motorised vehicle are unlikely and that this matter can be scoped out of the ES.	Noted Effects on people travelling by motorised vehicles will be scoped out for all phases.

Section Reference	Matter	Comments	Response
		Paragraph 10.10.6 of the Scoping Report refers only to the construction phase, however for the avoidance of doubt, the Inspectorate considers significant effects are unlikely for all phases of the proposed development and can be scoped out of the ES.	
ID 3.6.16	People travelling by train along the railway lines heading south from Goole – all phases	The Scoping Report states that railway lines cross the Study Area only where pipelines are proposed. The Inspectorate agrees that as a result and given the speed of rail travel and the nature of the proposed development, significant effects on rail users are unlikely and that this matter can be scoped out of the ES.	Noted Effects on people travelling by train will be scoped out for all phases.
ID 3.6.17	People at their place of work – all phases	The Inspectorate notes that this receptor group is generally considered to have low sensitivity as the surrounding landscape is of limited importance and / or not the focus of their activities. The Inspectorate agrees that significant effects are unlikely and that this matter can be scoped out of the ES.	Noted Effects on people in their place of work will be scoped out for all phases.
ID 3.6.18	The effects of lighting at the pipeline, AGIs and Pump Facility upon landscape, seascape and visual receptors – construction and decommissioning phases	The Scoping Report states that construction and decommissioning activities would take place predominantly in daylight hours and therefore the use of lighting would be temporary, minimal and could be suitably controlled through mitigation such that significant effects are not anticipated. The Inspectorate notes that paragraph 3.6.78 states that standard construction working hours would be Monday-Saturday 07:00 to 19:00 and as such, there is the potential for works to take place during darkness in the winter months. Nevertheless, subject to the mitigation measures detailed in paragraph 10.9.3 being demonstrably secured, the Inspectorate agrees that significant effects are unlikely, and an assessment of effects can therefore be scoped out of the ES. With regards to the effects of lighting during decommissioning, the Scoping Report states that there would not be 24-hour working. It notes there could be temporary, minimal lighting which would be controlled by measures in paragraphs 10.9.8 to 10.9.10; however, these measures are related to the operational phase, therefore the Inspectorate assumes measures would be more akin to those in paragraph 10.9.3. If the applicant can confirm that decommissioning activities would only take place during daylight, or that relevant mitigation measures would be employed, the Inspectorate agrees that an assessment of effects can therefore be scoped out of the ES. Table 10-13 does not state whether operational phase lighting impacts from the Pump Facility would be assessed. Paragraph 10.10.8 identifies potential impacts from the Pump Facility where operational lighting would be required, however paragraph 4.11.3 states there are no light-sensitive receptors nearby the Pump Facility. Subject to confirmation of the absence of sensitive receptors within the ES, and the mitigation proposed within paragraph 10.9.10 being demonstrably secured, the Inspectorate considers significant effects are unlikely. An assessment of effects can therefore be scoped out of the ES.	Noted An assessment of effects of lighting during construction and decommissioning phases within daylight hours will be scoped out. In locations where there is 24-hour Horizontal Directional Drilling (HDD) taking place during the construction phase, in locations where there are light-sensitive receptors and areas of dark sky baseline these will be scoped in and reported in the ES. Given that the existing night-time environment of the Pump Facility is already subject to relatively high levels of illumination, with limited potential for experiencing dark skies or high visual amenity after dusk and considering the likely very low number of PRoW users during these hours, visual receptors are not anticipated to experience significant impacts. As noted in the comment, they are proposed to be scoped out for all phases of assessment. Reference to paragraphs 10.9.8 and 10.9.10 in the Scoping Report (with regards to the mitigation of lighting effects during decommissioning) is an error. This should reference paragraph 10.9.3
ID 3.6.19	The effects of lighting at the Humber crossing upon	Given the nature of the Humber crossing element of the proposed development, the Inspectorate considers the significant effects from lighting are unlikely during the operational phase and that this matter can be scoped out of the ES.	Noted Effects of lighting at the Humber crossing upon

Section Reference	Matter	Comments	Response
	landscape, seascape and visual receptors – operational and decommissioning phases	On the assumption that the pipeline within the Humber crossing would remain in-situ upon decommissioning, the Inspectorate agrees that significant effects from lighting are unlikely during this phase and that this matter can be scoped out of the ES.	landscape, seascape and visual receptors will be scoped out.
ID 3.6.20	The impact of lighting at the pipelines and AGIs – operational phase	The Scoping Report states that the pipeline and AGIs would only require operational lighting at very infrequent occurrences during emergency situations. The Inspectorate agrees that significant effects are unlikely subject to the mitigation measures detailed in paragraphs 10.9.8 to 10.9.10 of the Scoping Report being demonstrably secured. An assessment of effects can therefore be scoped out of the ES.	Noted The impact of lighting at the pipelines and AGIs during operation phase will be scoped out.
ID 3.6.21	Magnitude of impact and receptor sensitivity	Tables 10-3 and 10-4 detail the ‘higher’ and ‘lower’ levels of susceptibility and value used to determine the sensitivity of landscape and visual receptors. Tables 10-5 and 10-6 detail the ‘largest’ and ‘smallest’ levels of factors used to determine impact magnitude. These tables imply that there is a sliding scale within which sensitivity of receptor and impact magnitude could lie. This differs from the commonly used approach of defining specific levels of receptor sensitivity and impact magnitude, as set out in Chapter 4 of the Scoping Report. The applicant should ensure that in using its proposed approach, clear explanations and justifications are provided as to where on these scales the receptor sensitivity and impact magnitude lie. In the absence of this, it will be difficult to understand how significance of effect is determined in accordance with Plate 10-1.	Noted The PEIR methodology below sets out explanation and justification as to where on these scales the receptor sensitivity and impact magnitude lie.
ID 3.6.22	Height assumptions	North Yorkshire Council has advised that construction tipping vehicles and cranes typically work above the 3m height currently stated within paragraph 10.6.8 of the Scoping Report. The applicant should seek to agree their assessment assumptions with relevant consultation bodies.	Noted Agreement of assessment assumptions, with regards to construction vehicle / plant height will be sought with relevant consultation bodies.
ID 3.6.23	Impacts on vegetation	The ES should detail the proposed mitigation planting to infill any gaps resulting from construction activities. The ES should detail the anticipated duration of effects which would be initiated during the construction phase and detail their anticipated duration (which may extend into the operational phase), along with assumptions on growth rates.	Noted The PEIR considered high level landscape mitigation planting. The ES will identify: all proposed mitigation planting; confirm the duration of effects being relied upon with regards to it; and justify the assumptions made in respect of plant growth rates.

Summary of Engagement

- 12.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 12-5 below.

Table 12-5 – Summary of Stakeholder Engagement relevant to Landscape and Visual Matters

Consultee	Date and method of engagement	Summary of Issues Raised	Response
Stakeholders EIA Scoping Opinion			
Canal and River Trust	27/1/25, response to scoping opinion	Chapter 10 advises that a LVIA will be carried out. Paragraph 10.3 refers to the proposed method of assessment. The LVIA will be informed by a map of Zone of Theoretical Visibility (ZTV) to illustrate the theoretical visibility of the Project during the operational phase and will be produced to inform the assessment. Due to the nature of the pipeline, the Trust believe that is it unlikely that there will be a significant visual impact to the setting of our waterways during the operational phase. However, it is likely that temporary impacts during the construction phase could have an adverse impact, for example the impact of construction compounds, temporary fencing, vehicular and equipment mobilisation areas, works lighting, or spoil mounding from the drilling process. Paragraph 10.9.3 does highlight appropriate mitigation to help limit the impact of temporary works, whilst 10.10.5 does identify that impacts on canal and river users will be scoped into the assessment. We therefore take no issue with the approach taken but do request that the examples of construction impacts on our users discussed in the paragraph above are incorporated into the assessment.	The Trust's comments are noted regarding the likely limited significance of operational visual impacts on the setting of waterways, and the potential for temporary impacts during the construction phase. The PEIR has given preliminary consideration to these matters, including construction compounds, temporary fencing, vehicular and equipment mobilisation areas and lighting. The ES will provide a full LVIA, informed by a Zone of Theoretical Visibility (ZTV), and will include assessment of both operational and construction phase effects.
National Grid	29/1/25, response to scoping opinion	If a landscaping scheme is proposed as part of the proposal, we request that only slow and low growing species of trees and shrubs are planted beneath and adjacent to the existing overhead line to reduce the risk of growth to a height which compromises statutory safety clearances.	A landscape mitigation scheme will be reported in the ES. Trees and shrubs species will be selected in accordance with statutory safety clearances for overhead lines, where applicable.
National Highways	30/1/25, response to scoping opinion	The Report highlights that consideration of the effects resulting from the Project's proposed lighting scheme upon landscape and visual receptors during construction, operation and decommissioning will be undertaken. National Highways would state that, where any construction/decommissioning facilities will be visible from the SRN, the Applicant must provide an appropriate assessment of the visual impact they might have on driver perception and amenity, and consequently on the safe operation of the SRN.	In this PEIR, preliminary consideration has been given to the potential for visual impacts of construction and decommissioning works upon users of the SRN. No significant effects are anticipated.
North Lincolnshire Council	30/1/25, response to scoping opinion	Our standard advice is as follows: "Landscape and visual impacts will need to be considered in terms of the adopted Landscape Assessment and Guidelines and the Countryside Design Summary. I would also recommend the use of the Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA3, 2013), produced by the Landscape Institute and the Institute of Environmental Management & Assessment. Core Strategy Spatial Objective 10, policies CS5 and CS16 and Saved Local Plan Policies LC7, LC14 and RD2 should also be considered.	The Landscape and Visual reports in the PEIR and ES will be undertaken in line with GLVIA3 (2013) and with reference to the adopted Landscape Assessment and relevant local planning policies. The sensitivity of the Isle of Axholme landscape has been noted. A full assessment will be reported in the ES

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		In the relatively open landscape of the Isle of Axholme, both new structures and any trees planted to screen them can dramatically alter the landscape character.” The proposed approach to landscape and visual impacts, as set out in Chapter 10 of the EIA Scoping Report, closely matches this advice.	
North Yorkshire Council	31/1/25, response to scoping opinion	Key landscape and visual considerations within the EIA / LVIA should include: • Construction, operational, decommissioning phase landscape and visual effects • Operational restrictions on land along the pipeline corridor (24.4m). • The overall scale and nature of the proposed development including Cumulative Effects • Night-time visual effects (temporary construction and permanent lighting) • Wider landscape strategy and GI connectivity (including along the proposed gas pipeline connection corridor) • Long-term maintenance and management	These matters have been noted. The PEIR has given preliminary consideration to construction, operational and decommissioning phase effects, as well as night-time visual effects. The ES will include full assessment of these issues, including cumulative effects, operational restrictions along the pipeline corridor, and long-term maintenance and management. Consideration will also be given to the wider landscape strategy and opportunities for green infrastructure connectivity.
		The landscape strategy and mitigation should be proportionate to the scale of the development and be robust enough to accommodate these large-scale and cumulative effects at a wider strategic level and also take account of uncertainties remaining until development of the detailed design stage.	A proportionate landscape strategy and mitigation plans will be developed and reported in the ES, addressing both site-specific and wider cumulative effects, and taking account of uncertainties until detailed design is available.
		We note that the draft Order Limits are typically a minimum of 300m wide with some areas such as near Drax being wider. We also note that the DCO will seek to protect the pipeline by restrictions placed on land over and immediately around it in a corridor width up to 24.4m. These restrictions may prevent constructing over it or planting deep-rooted trees over it.	The draft Order Limits reflect the preliminary design and survey requirements at this stage. The ES will assess potential effects of the proposed 18.3m operational corridor, including restrictions on construction and planting, as part of the LVIA.
		The Applicant should consider offsite mitigation to compensate for and offset residual adverse effects or thought a dedicated community enhancement fund where this cannot be achieved within the site.	Noted. The Project will give all appropriate measures due consideration as it develops its appropriate mitigation package.
		We would expect the landscape and visual assessment to be based on maximum parameters and a cautious worst-case approach, to ensure that significant effects are properly assessed.	The LVIA will be undertaken on a precautionary worst-case basis, using maximum parameters and considering visibility during the winter season to ensure that potential significant effects are appropriately assessed.
		The proposed intention to use the ‘Rochdale Envelope’ approach are noted in Chapter 4.2 of the Scoping Report, and to consider the worst-case parameters. In the absence of detailed design for the temporary construction works, AGIs and the design and alignment of the pipeline and other associated infrastructure, we would suggest a proactive approach should be taken by the Applicant for improving the existing vegetation within the application site and Proposed Pipeline	The PEIR adopts a precautionary approach using the Rochdale Envelope and worst-case parameters. Opportunities to enhance existing vegetation within the application site and Proposed Pipeline Corridors will be considered, and the ES will provide detailed landscape

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		Corridors. This would give us confidence that further landscape and arboricultural impacts could be sufficiently mitigated at the detailed design stage.	and arboricultural mitigation measures once the design is sufficiently developed.
		For a development of this scale, we would also expect to see clear provision of green infrastructure actively applied within the whole of the application area (the draft Order Limits).	The provision of a site-wide Green Infrastructure strategy will initially need to be agreed with the DCO Applicant.
		Legislation and Policy– guidance and policy relating to landscape and visual effects should be reviewed and updated at chapter 10.2 as appropriate. The overarching National Planning Policy for Energy (EN-1), November 2023, recognises the likely adverse landscape effects of NSIPs, but also refers to siting and good design in order to minimise harm, providing reasonable mitigation where possible and appropriate. The ‘Criteria for good design for Energy Infrastructure’ are set out in Chapter 4.7 (EN1). The requirements and principles for ‘Landscape and Visual’ are set out in Chapter 5.10 (EN-1). Other relevant local policy within the Selby planning area may include SP15, SP17, SP18, SP19, ENV1, ENV3.	A review of the current Legislation and Policy– guidance and policy relating to Landscape and Visual effects has been carried out for this PEIR. The PEIR has given preliminary consideration to the likely Landscape and Visual effects of the Project, recognising the importance of siting, good design, and the provision of reasonable mitigation. A full assessment, including detailed mitigation measures, will be presented in the ES.
		Landscape and Visual Methodology – We would generally welcome the proposed methodology and approach set out in the Scoping Report Chapter 10 Landscape and Visual. This should also include photography to current LI guidance on ‘Visual Representation of Development Proposals’ (see Photographs and Photomontages below). We also draw your attention Technical Guidance Note LITGN – 2024-01 Published August 2024, as clarification on aspects of GLVIA3. This provides important clarification on a number of points (e.g. Para. 3(3) Weighting of the components of magnitude of effect: scale of effect, geographical extent, and duration / reversibility. Para. 8(2) Assessment of night-time effects).	The PEIR methodology for Landscape and Visual assessment follows the approach set out in Chapter 10 of the Scoping Report and will be refined in the ES. Photography and visual representations have been prepared in accordance with current Landscape Institute guidance on the Visual Representation of Development Proposals. The assessment will also take account of the Technical Guidance Note LITGN–2024-01 (August 2024), including the weighting of magnitude of effect and consideration of night-time effects, to ensure a robust and consistent approach in the LVIA..
		Study Area – We would generally support the proposal for an initial 10km radius study area for the LVIA cumulative assessment. It may be appropriate to reduce this for other parts of the assessment, determined and agreed as the assessment progresses (typically through ZTV analysis and likelihood of effects).	The PEIR has proposed an initial 10 km Study Area for the LVIA cumulative assessment. The full cumulative assessment, including any refinements to the Study Area, will be undertaken and reported in the ES.
		Night-Time Visual Effects – We agree that night-time visual effects should be scoped into LVIA. We would wish to see consideration of how illumination of the proposed development would be reduced through good design, to reduce urbanising influence and prevent further erosion of the baseline	The ES will provide a qualitative lighting assessment, including consideration of design measures to minimise illumination, reduce urbanising influence, and protect the baseline character of the landscape.
		The operational life of the proposed scheme should also be taken into account. We would wish to see certainty that site vegetation would be retained and maintained for the lifetime of the proposed development.	The PEIR has given preliminary consideration to the operational phase of the Project. The ES will provide a full assessment, including measures to ensure that site

Consultee	Date and method of engagement	Summary of Issues Raised	Response
			vegetation is retained and maintained throughout the operational lifetime of the development.
		Temporary access, storage and working areas – these should be taking into account as part of the assessment. The worst-case working height for construction vehicle movements should be reviewed for the visual assessment and ZTVs. Construction tipping vehicles and cranes typically work above the 3m height currently stated within para. 10.6.8 of the Scoping Report.	The PEIR has given preliminary consideration to temporary access, storage, and working areas. The ES will provide a full assessment, including review of the worst-case working heights for construction vehicles, tipping vehicles, and cranes, and their potential visibility in ZTVs and visual receptors.
		Visual Assessment and Representative Viewpoints - The quantity and location of representative viewpoints should be agreed with the Local Planning Authority. Typically, we would wish to see proposed viewpoints together with a ZTV of the proposed development overlaid onto a constraints plan with information of receptors they represent. Viewpoints should be selected for both the construction and operational phase (temporary and permanent installations) where there is potential for adverse visual effects. It may be appropriate to provide multiple ZTVs for different sections or phases of the development (e.g. temporary storage, vehicle movements and AGIs), and to understand what is visible from where.	In this PEIR, a ZTV has been prepared for the operational phase only. The ES will provide the full LVIA, including where appropriate, ZTVs for different phases of the development, including temporary construction effects, to assess potential adverse visual impacts
		The principle of using representative viewpoints to illustrate the experience of different types of visual receptor is acceptable, however the assessment should aim describe and assess the full effects of the development (not limited to a summary of viewpoints) and to explain the scale and geographical extent of effects.	The PEIR includes a preliminary appraisal using representative viewpoints to illustrate potential visual effects. The ES will provide a full LVIA, describing and assessing the full effects of the development, including the scale and geographical extent of impacts, beyond the selected viewpoints.
		Photographs and Photomontages – should be in-line with Technical Guidance Note (TGN) 06/19 Visual Representation of Development Proposals (Landscape Institute, 2019). We would wish to see photomontages to explain how adverse effects will be mitigated over time. Photographs should include winter views where possible to explain the worst-case scenario. Appendix 3 and 4 in TGN 06/19 should be noted, with camera / tripod height / position in the field adjusted as necessary so that views show the full extent of the site / development and show the effect it has upon the receptor location. Views of the site should not be unnecessarily obscured by buildings, roadside hedgerows or other vegetation.	Technical Guidance Note (TGN) 06/19 Visual has been referenced for photographs and photomontages.
		Site Design, Landscape Proposals, Mitigation, Maintenance and Aftercare – Notwithstanding the criteria used by the Applicant within the EIA to determine ‘significant effects’ other adverse effects should not be ignored particularly where it is reasonable and possible to reduce these though ‘good design’.	In this PEIR, high-level considerations of landscape proposals, and mitigation have been given. The ES will provide a full landscape strategy, including detailed proposals, good design principles in line with EN-1 and EN-4, long-term maintenance, cumulative effects, and opportunities to enhance green and blue infrastructure in

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		Overarching National Policy Statements for (EN-1, EN-4) set out criteria for 'good design' and acknowledges the benefits of good design in mitigating the adverse impacts of a project, including the landscape and visual effects. We would wish to see a landscape strategy for proposed scheme, which helps minimise adverse effects and demonstrated good design. The landscape strategy should consider the wider site and future maintenance responsibilities. Consideration should be given to limitations of future maintenance access and easements along the line of the pipeline, particularly where this might affect retention and replacement of vegetation. Where the 'Rochdale Envelope' principles are to be applied, consideration should also be given to develop clear design guidance parameters which can be secured alongside the parameters plan in the DCO. Landscape proposals should support the Government's commitment to improving green infrastructure, health and wellbeing, as set out in the 25 Year Environment Plan. The Leeds City Region Green and Blue Infrastructure Strategy, NPPF and other and local policy also recognise GI. The applicant should consider a wider strategic approach to landscape proposals and mitigation of cumulative effects and how this would contribute to Natural England's 15 Green Infrastructure Principles of 'Why', 'What' and 'How' (https://designatedsites.naturalengland.org.uk/GreenInfrastructure/Principles/GIPrinciples.aspx). Link to Natural England's Green Infrastructure Principles and the England Green Infrastructure Mapping: https://designatedsites.naturalengland.org.uk/GreenInfrastructure/Principles/GIPrinciples.aspx. Long-term maintenance and management should be considered, particularly where this is needed for ongoing mitigation, screening and biodiversity benefit. Sufficient stand-off distance should be provided from existing trees and vegetation where these are to be retained and protected and to allow maintenance access or for easements.	accordance with national and local guidance, including Natural England's Green Infrastructure Principles.
		The landscape strategy and mitigation should be proportionate to the scale of the development and be robust enough to accommodate these large-scale and cumulative effects at a wider strategic level and also take account of uncertainties remaining until development of the detailed design stage.	In this PEIR, high-level considerations of landscape strategy and mitigation have been given. The ES will provide a proportionate and robust landscape strategy, addressing large-scale and cumulative effects and taking account of uncertainties until detailed design is developed
EIA Scoping Report engagement			
Natural England	Consulted via email on November 13 th , 2024 and	No Landscape and Visual related issues raised	N/A

Consultee	Date and method of engagement	Summary of Issues Raised	Response
	feedback received on November 22 nd , 2024		
Post-scoping Engagement			
North East Lincolnshire Council	11 th March 2025 Scoping Technical Engagement document has been shared with the Council / Agree the location of viewpoints within administrative boundary prior to photographic survey.	Trees & Woodlands Officer. With regards to the link to the LIVA methodology document below, I have read Chapter 10 - Landscape and Chapter 7 - Ecological / Habitat, and I have noted the parameters of the study area. The methodology is not substantially different to other LIVA's that have come across my desk. I have no concerns over how the LVIA is to be carried out, I appreciate the subjective element of LVIA but even then, I do not envisage any fundamental divergence in evaluating the evidence or the conclusions presented. The nature of the project means much of the visual impact will be transient, the only permanent element will be the pumping stations. The document recognises the pumping station will be a permanent above ground feature and accepts these features will need to be landscaped to settle them into the landscape. In conclusion, the number and locations of the viewpoints are acceptable	The PEIR has given preliminary consideration to the transient nature of visual effects and the permanent presence of AGIs and the pumping station. Detailed landscaping and mitigation measures for permanent features will be developed and reported in the ES.
East Riding of Yorkshire Council	7 th March 2025 Agree the location of viewpoints within administrative boundary prior to photographic survey.	Informal comments were provided by B2B in preparation for initial photography survey. The selection of viewpoints proposed appears to be based on relevant Public Rights of Way and therefore seems to be appropriate. Consider full list of possible landscape / visual receptors affected and heritage assets whose appreciation or setting might be affected these matters in determining viewpoint selections. Use Landscape Institute Guidance Note TGN06/19 (Visualisation of Development Proposals) and its requirement for a Visualisation Type Methodology (para 3.7) to determine appropriate Visualisation Type(s) – which might influence your choice of photographic equipment and techniques.	This PEIR has prepared initial visualisations in accordance with Landscape Institute Guidance Note TGN06/19. Some viewpoints could not be accessed due to land access and health & safety constraints; these will be included, refined and reported in the ES to ensure all relevant Landscape and Visual receptors, including heritage assets, are represented.
North Lincolnshire Council	17 th March 2025 Agree the location of viewpoints within administrative boundary prior to photographic survey.	We have reviewed the suggested viewpoints for the LVIA and are generally content with them. However, I have received the below comments from our Historic Environment Record that are pertinent to the LVIA and Heritage Assessment with regards to relevant viewpoints from designated heritage assets. • Keadby AGI – no further comments. • Winterton AGI – ZTV suggests limited visibility from the W Halton group of designated assets and I suspect that the houses and trees around the green will screen the AGI at this distance,	The comments from the Historic Environment Record regarding additional or refined viewpoints were not available prior to the initial site visit. These will be reported in the ES, with further winter-season photography surveys undertaken to capture the suggested viewpoints, guided by ZTV analysis and to

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		even though location is up on the ridge; viewpoint 3 should be a proxy for view from the Hollies farmhouse on the edge of W Halton. • Barrow AGI – no further comments • Croxton AGI – viewpoint 1 should be moved a short distance up the slope to the corner or a point adjacent to the Yarborough Camp Scheduled Monument (note: woodland has recently been clear felled so a wireframe from within the monument itself should be provided in the Heritage Assessment. Agree with Felix that an additional viewpoint to produce wireframe from the Church overlooking the western section of Croxton scheduled monument should be provided. For the potential alternative AGI area, a viewpoint for a wireframe from the centre of Kirmington Roman settlement scheduled monument should be provided for the heritage assessment along the footpath west of Croxton Road at TA0965 1137. • East Halton AGI – key view needed for wireframe from within the footprint of Thornton Abbey church at TA1180 1895 • Killingholme AGI – no further comments.	inform the full LVIA and Heritage Assessment, including wireframes from the specified heritage assets.
North Yorkshire Council	17 th March 2025 Agree the location of viewpoints within administrative boundary prior to photographic survey.	We would expect you to consider representative viewpoints for all aspects of the development including cumulative effects. It is down to your team on the ground to identify the most suitable view of the proposed development. Where possible, would expect these to be open views of the development and to represent worst-case, in accordance with the guidance.	In this PEIR, representative viewpoints have been selected for accessible locations, focusing on open views and worst-case scenarios where possible. Preliminary ZTVs were used to inform viewpoint selection. The LVIA will provide the full assessment, including cumulative effects, with refined viewpoints agreed as appropriate.
Future Engagement			
Canals & Riverside Trust	Agree the location of viewpoints with regards to effects upon the visual amenity of recreational users of the Aire and Calder Navigation, the Stainforth & Keadby Canal, and the River Ouse		
Local Authorities	The ES will report viewpoint locations, including those affecting heritage asset settings, which will be refined and agreed with local authorities. ZTV analysis, land access, and winter-season photography will guide selection of representative viewpoints for both construction and operational effects. Cumulative effects, landscape and visual receptors, and detailed mitigation proposals, including long-term vegetation management and green infrastructure enhancements, will also be discussed with local authorities to ensure alignment with local policy and guidance.		

12.4 Assessment Methodology

Baseline Data

Study Area

- 12.4.1 A provisional LVIA Study Area is set out on Volume 3 - Figure 12.1. It has been determined using familiarity with the landscape surrounding the Project, professional judgement and experience of other similar Projects in this locality. It takes into consideration the expected form and scale of the construction, operation and decommissioning activities of the Project, the nature of the receiving landscape, and the awareness of likely landscape character and visual amenity receptors that may experience significant effects as a result of it.
- 12.4.2 The extent of the Study Area depends on the nature of the activity as well as the height of the temporary and permanent elements that constitute the Project.
- 12.4.3 The current draft Order Limits have been developed with consideration for environmental constraints. For example, the Project has sought to site development away from designated areas, settlements and private dwellings and utilising previously developed land and existing access tracks, where possible. The draft Order Limits have, however, been set intentionally wide to allow for further design development, and some evolving optionality, regarding the following:
- The alignment of the pipeline route.
 - The positioning of temporary construction accesses and compounds.
 - The positioning of the permanent AGIs and Pump Facility and accesses to these.
- 12.4.4 The design development and optioneering will take into consideration possible Landscape and Visual effects using the 'zone of theoretical visibility' (ZTV) analysis and the LVIA authors' developing understanding of the provisional Study Area, in order to avoid and / or minimise such effects.
- 12.4.5 Subsequently, it is expected that the draft Order Limits will contract as the design matures. Accordingly, the LVIA Study Area is also expected to contract, as its outer boundary is offset from that of the draft Order Limits.
- 12.4.6 The LVIA Study Area will also be amended as awareness of any potential significant cumulative Landscape and Visual effects emerging from the

construction, operation and decommissioning of the Project in combination with other relevant projects in the area.

Pipeline

- 12.4.7 As the pipeline aspect of the Project contains no permanent above ground elements (outside of the AGIs and Pump Facility, dealt with below) it will only be the construction activities that will inform the extent of the LVIA Study Area for the pipeline.
- 12.4.8 It is currently expected that those elements of the pipeline construction that are relevant to a LVIA comprise: construction plant / vehicle movements and parking, spoil stockpiling (not exceeding approximately 3 m in height), construction compound office and welfare cabins (not exceeding approximately 3m in height) and security fencing (not exceeding approximately 2.5 m in height).
- 12.4.9 Given the relatively small scale of these elements, their temporary nature, and the short duration of their existence, the LVIA Study Area around the draft Order Limits for the pipeline will extend to 1 km.

Above Ground Installations

- 12.4.10 It is currently anticipated that the maximum height of the permanent structures and equipment that would form the majority of the Project's AGIs would not exceed 3m which is the approximate height of high security fencing (surrounding the 'inlet', 'junction' and 'block valve' stations and pipeline monitoring units within them). As such, it is anticipated that the AGIs may be perceptible from up to 2-3km away.
- 12.4.11 Beyond 1.5 km, however, such structures would form very small vertical components in views, and the build-up of intervening layers of landform, vegetation and buildings would markedly reduce their degree of visibility to the point that they would form relatively indistinct constituents of people's overall visual experience.
- 12.4.12 As such, beyond 1.5 km the AGIs are considered unlikely to bring about any significant effects upon Landscape and Visual receptors, and so the LVIA Study Area around the draft Order Limits of these elements and their associated construction zones will be set at this distance.

Pump Facility

- 12.4.13 It is currently anticipated that the Pump Facility would contain CO₂ pump units (approximately 2.7 m high) contained within a single structure; single storey control room, administration and welfare buildings; a workshop with a roof ridge of approximately 8 m; and 3 m high security fencing. Consequently, the LVIA Study Area around the draft Order Limits for this facility will extend to 2.5 km.

Humber Crossing

- 12.4.14 The exact trenchless construction method and duration for the Humber crossing is not yet confirmed i.e. tunnelling or horizontal directional drilling. Therefore, the extent of the LVIA Study Area around the draft Order Limits for this area is provisionally set at 2.0 km to cover a worst-case scenario where tall construction machinery is needed on either side of the River Humber.

Cumulative Assessment

- 12.4.15 The extent of the LVIA Study Area may also need to adapt when those Projects that are to be included within the cumulative LVIA are known.

Baseline Data Collection

Desk Study Sources

- 12.4.16 Baseline conditions of the Project were established during a desk study using the following sources:
- Review of national and local planning policy.
 - Analysis of Ordnance Survey (OS) mapping and publicly available aerial imagery.
 - Analysis of published national, regional and local character assessments, together with a detailed analysis of the local landscape character within the draft Order Limits and local landscape designations to identify potential sensitive landscape receptors.

Zone of Theoretical Visibility

- 12.4.17 Zone of Theoretical Visibility (ZTV) maps, which illustrate the theoretical visibility of the Project during the operational phase have been produced to inform the identification of potential Landscape and Visual receptors (Volume 3 - Figure 12.2 ZTV Bare Earth and Viewpoint Location and Volume 3 - Figure 12.3 ZTV Screening Features and Viewpoint Locations). Initial ZTVs were generated in Geographic Information System software using Ordnance

Survey's Terrain 5 Digital Terrain Model without the screening effects of buildings and vegetation included in them (which are likely to preclude visibility of the Project from certain areas in the LVIA Study Area). These 'bare earth' ZTVs provided the very 'worst-case' scenario, and the largest geographical area from which the Project may be visible.

12.4.18 Following this, Ordnance Survey digital mapping layers containing inventories of known woodlands and buildings were added and their locations extruded to average heights, so that a more accurate digital surface model was created, and a 'screening features' ZTV was prepared.

12.4.19 The 'bare earth' and 'screening features' ZTVs will be updated and reported in the ES.

Representative Viewpoints

12.4.20 Preliminary viewpoints have been selected to represent the different types of receptors likely to be impacted by the Project and have been informed by the ZTV analysis, desk-based research on the location and distribution of community and recreation receptors and following engagement with stakeholders, including the LPAs.

12.4.21 The viewpoints are representative of views experienced by visual receptors at either:

- Singular destinations (such a public open spaces, visitor destinations).
- Points along a particular line of movement (e.g., along a PRow, footway through a settlement, waterway or towpath).
- In both instances the exact locations of the representative viewpoints selected will be the most notable / and or general worst-case views towards the Project.
- Whilst the representative viewpoints will be used to help describe the likely changes to landscape character and visual amenity brought about by the Project, and therefore inform the assessment of resultant effects, the LVIA will not assess the impact on receptors just at these locations. Instead, it will take into consideration the wider character area covered by the Project, and the overall dynamic and kinetic visual experience of a visual receptor.
- The selection of representative viewpoints would be agreed with the relevant local stakeholder listed in Table 12-5.

- The photographs collected from each ‘representative viewpoint’ location would conform with the Landscape Institute’s ‘Technical Guidance Note 06/19: Visual Representation of Development Proposals’ (Ref 12.11).

Site Visits and Winter Photography Survey

- 12.4.22 Winter site visits were undertaken in March 2025 which provided ‘ground truthing’ and verification for the choice of representative viewpoint locations. This was to enable assessment of the baseline visual amenity and to take 360-degree photography from each of the viewpoint locations.
- 12.4.23 The receptors as represented by the viewpoints are shown in Volume 3 - Figure 12.2 - ZTV Bare Earth and Viewpoint Location, and Volume 3 - Figure 12.6 - Visual Amenity and Representative Viewpoints Plan. The approximate positions of these publicly accessible locations were agreed with the relevant local authorities as part of the engagement process.
- 12.4.24 At this stage, 35 viewpoint photographs (360 degree) were taken on site. These will be further refined as part of the LVIA (reported in the ES) and agreed with the relevant local authorities as part of further consultation and once the exact layout of the AGIs is finalised. Some initially selected viewpoints could not be accessed by the survey team due to land access and health and safety constraints; these will also be reviewed and reported in the ES.
- 12.4.25 All photographs and visualisations were produced in line with the Landscape Institute Technical Guidance Note (TGN) 06/19 (2019); ‘Visual Representation of Development Proposals’. Annotated photo-panoramas, prepared to the specifications of TGN 06/19 Type 1, illustrate the indicative locations of the AGIs and the Pump Facility, together with other features of relevance to the assessment of landscape character. At this stage, no dimensional or height information is presented; the annotations are limited solely to the indication of indicative horizontal positioning of the AGIs.
- 12.4.26 The fieldwork also provided the opportunity to ground-truth the desk-based landscape character research undertaken and gain a better understanding and appreciation of the condition and value of the already established local landscape character areas / types found within LVIA Study Area. The fieldwork would be undertaken during winter months to fully understand the range of general visibility through the landscape.

- 12.4.27 A visual survey was also undertaken at night during the March 2025 site visit to understand the degree of existing lighting within the vicinity of Easington Pumping Facility, so that the impact of new lighting could be considered.

Visualisations

- 12.4.28 Visualisations have been used to consider and illustrate changes to views during the operation of the Project and have been prepared in accordance with the Landscape Institute's 'Technical Guidance Note 06/19: Visual Representation of Development Proposals' (Ref 12.11).
- 12.4.29 Type 1 visualisations (annotated photo-panoramas) have been prepared for all viewpoints. In the ES, when more detailed design information is available, Type 3 visualisations (photo wires) will be prepared for the views to AGIs and the Pump Facility where the sensitivity of identified receptors and the context, scale and proximity of the Project warrant it.
- 12.4.30 Type 3 visualisations would show the AGIs / Pump Facility overlain upon the collected winter photography at year 1 following the Project's completion (i.e. the worst-case scenario), and then upon the summer photography 15 years following this when any potential landscape mitigation (such as structural planting) would be expected to be established.

Impact Assessment Methodology

General Methodology and Association with other Topics

- 12.4.31 This section sets out an overview of the LVIA methodology in the PEIR. Aspects of this methodology would potentially be developed further and / or refined as the LVIA baseline study is progressed and as engagement with stakeholders occurs, this would be reported in the ES.
- 12.4.32 The methodology has been based on principles set out in GLVIA3 and its related guidance documents listed in 12.2. These not only establish good practice guidance for LVIA's but also comply with the requirements of EN-1 and EN-4.
- 12.4.33 GLVIA3 advocates that the assessment should be proportionate to the scale and nature of the proposals and should focus on the 'likely' significant effects, rather than every conceivable effect – an approach that aligns with the requirements of the EIA Regulations 2017. This approach provides an opportunity to scope out particular receptors, where it can be demonstrated that

significant effects would be unlikely to arise. The ultimate aim being to present more concise and meaningful assessments.

- 12.4.34 The assessment methodology involves a combination of quantitative and qualitative considerations and the application of professional judgement within a structured assessment framework. As set out in GLVIA3:

“...Whilst there is some scope for quantitative measurement of some relatively objective matters, ...much of the assessment must rely on qualitative judgement, for example what effect the introduction of a new development or land use change may have on visual amenity, or about the significance of change in the character of the landscape and whether it is positive or negative” (Paragraph 2.23).

“In all cases there is a need for judgements that are made to be reasonable and based on clear and transparent methods so that the reasoning applied at different stages can be traced and examined by others.” (Paragraph 2.24).

- 12.4.35 Consideration has been given to the inter-relationship of baseline information and impacts from the Project between Chapter 7: Ecology and Biodiversity in relation to potential vegetation removal and Chapter 11: Cultural Heritage in relation to the viewpoints from heritage assets. Where relevant the LVIA will further analyse inter-related baseline information and impacts from the Project between different EIA topics as the design is developed and BNG is considered, for example:

- The baseline information collected for Chapter 7: Ecology and Biodiversity will be used to better understand the contribution biodiversity-related designations or protected areas (such as Sites of Special Scientific Interest, Tree Preservation Orders, and Ancient Woodland) located within the LVIA Study Area make to the landscape’s conservation interest. These in turn will inform judgments upon the ‘value’ (and subsequently, therefore, the ‘sensitivity’) of landscape character receptors.
- The baseline information collected for Chapter 11: Cultural Heritage will be used within the LVIA to better understand the contribution heritage designations (such as the Registered Parks & Gardens of Historic Interest and built Conservation Areas) and heritage assets make to the conservation interest and cultural associations of the landscape and to visual amenity within the LVIA Study Area. This includes becoming aware of ‘designed’ or ‘recorded’ views, where they are publicly accessible. This will inform judgments upon the ‘value’ (and subsequently, therefore, the ‘sensitivity’) of landscape character and visual amenity receptors.

- The baseline information collected for Chapter 14: Socio-economics will be used to better understand the presence of publicly accessible recreational resources within the LVIA Study Area, and (where information is available) how well they are frequented by users.

12.4.36 As such, and to avoid duplication of effects across the PEIR the following impacts of the Project are not covered within this chapter:

- Any biodiversity designations or protected areas, such as Sites of Special Scientific Interest, Tree Preservation Orders, and Ancient Woodland – as these will be addressed in Chapter 7: Ecology and Biodiversity.
- Any heritage-related designations including Registered Parks & Gardens of Historic Interest and built Conservation Areas – as these are considered to be more heritage-related than landscape-related and so will be addressed in Chapter 11: Cultural Heritage (the visual amenity of users have been considered).
- Any recreational resource (such as country parks, campsites and National Trust properties) – as these would be addressed in Chapter 14: Socio-Economics (the effects upon the visual amenity of users of these only are considered within the PEIR).

12.4.37 The effects on landscape character, landscape features and elements and visual amenity have been considered for the following scenarios:

- Construction Phase – LVIA will consider the worst-case situation whereby construction activity is at its peak.
- Year 1 - a winter's day in the first year that the Project becomes fully operational, reflecting the maximum visibility / worst case scenario.
- Year 15 – a summer's day in the 15th year after the Project becomes fully operational, reflecting the presence of leaves on deciduous woody vegetation and the likely maximum mitigation from proposed planting (where implemented).
- Decommissioning Phase - This will assess a situation whereby the proposed areas of Above Ground Infrastructure (AGI) and the proposed Pump Facility at Easington are removed, but the pipeline will remain in-situ, and the landscape is returned to its former use.

Landscape Resource

12.4.38 The baseline study identified the existing character of the landscape, its constituent elements, features and its geographical and historical context. It assessed the condition of the landscape, the way it is experienced, the value

attached to it and its susceptibility to change. The assessment of susceptibility to change examined whether the landscape resource as a whole could accommodate the Project without significant changes.

12.4.39 The identification of character areas was informed by published character assessments: The National Character Area (NCA) profiles published by Natural England provided the wider landscape context of the Project. The findings of the desk study were reviewed in conjunction with the survey to identify the site-specific local landscape character.

12.4.40 The assessment considered:

- The physical influences on the landscape resource – geology, soils, landform, drainage and water bodies.
- The influence of human activity – land use, land management, the character of settlement and buildings, the pattern and type of fields and enclosure.
- The aesthetic and perceptual aspects of the landscape - scale, complexity, openness, tranquillity, and wildness.

Landscape Receptor Sensitivity

12.4.41 The sensitivity of landscape receptors (defined as high, medium or low, or intermediate levels between these) has been determined by the consideration of their 'susceptibility' and 'value' (see Table 12-6 Susceptibility of Landscape Receptors and Table 12-7 Landscape Value) and informed by professional judgement. An explanation of the level of sensitivity given to each receptor is described so that it is clear how each judgement has been made.

12.4.42 Landscape sensitivity considers the robustness of the landscape to accommodate change. The evaluation of the sensitivity of the landscape resource was based on factors and attributes which impact the value of the landscape and its susceptibility to change. These criteria are set out in the Table 12-6 - Susceptibility of Landscape Receptors, below.

12.4.43 GLVIA3 (paragraph 3.26) states that: "the sensitivity of the landscape character resource, and the receptors identified to be representative of this, should be determined by consideration of the 'susceptibility' of the receptor (to the change proposed) with the receptor's relative 'value', i.e.: Landscape Sensitivity = Landscape Susceptibility + Landscape Value."

Landscape Receptor Susceptibility

- 12.4.44 Landscape ‘Susceptibility’ is defined in GLVIA3 (paragraph 5.40) as “the ability of the landscape receptor (whether it be the overall character or quality / condition of a particular type or area, or an individual element and / or feature, or a particular aesthetic and perceptual aspect) to accommodate the Project’s without undue consequences for the maintenance of the baseline situation and / or the achievement of landscape planning policies and strategies.”
- 12.4.45 Reasoned professional judgements on the ‘susceptibility’ of landscape receptors are recorded as ‘high’, ‘medium’ or ‘low’, as set out within Table 12-6 - Susceptibility of Landscape Receptors, below.

Table 12-6 – Susceptibility of Landscape Receptors

Landscape Sensitivity / Value of a Receptor	Description / Typical Criteria
High	The landscape receptor is less able to accommodate the development proposed without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer limited opportunities for accommodating the change without key characteristics being fundamentally altered, leading to a different landscape character.
Medium	The landscape receptor is partly able to accommodate the Project without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape offer some opportunities for accommodating the change without key characteristics being fundamentally altered
Low	The landscape receptor is more able to accommodate the Project without undue negative consequences to the baseline situation. Attributes that make up the character of the landscape are resilient to being changed by the Project

Landscape Receptor Value

- 12.4.46 In contrast to 'susceptibility', the categorisation of landscape 'value' of a landscape receptor relates purely to its existing baseline, and as such is independent of any development proposal. Value' is defined in the GLVIA3 (paragraph 5.19) as
- 12.4.47 *"...the relative value that is attached to different landscapes by society, bearing in mind that a landscape may be valued by different stakeholders for a whole variety of reasons..."*
- 12.4.48 It goes on to state that *"A review of existing landscape designations is usually the starting point in understanding landscape value, but the value attached to undesignated landscapes also needs to be carefully considered and individual elements of the landscape- such as trees, buildings or hedgerows -may also have value. All need to be considered where relevant."*

Table 12-7 – Landscape Value

Landscape Value of a Receptor	Description / Typical Criteria
High International or national: the landscape might be located in world heritage site, National Landscapes, historic park and garden, conservation area or similarly designated.	Landscape of high scenic quality with a distinctive combination of features, elements and characteristics, outstanding views and a strong sense of place. Important cultural associations. A scarce or fragile landscape with historic or ecological elements which make major contribution to landscape character. A tranquil landscape in good condition, largely intact, with an unspoilt character and a high susceptibility to change.
Medium Regional or district: the landscape might be located in, regional park, historic park and garden, conservation area or similar or in an undesignated area, but is of significance through literary or	Landscape of some scenic quality with a combination of features, elements and characteristics and a moderate sense of place. Some cultural associations. A landscape with mainly common but occasionally interesting features. Some historic or ecological elements which contribute to landscape character. Some high use areas, but overall medium tranquillity. A

Landscape Value of a Receptor	Description / Typical Criteria
cultural associations or through demonstrable use.	landscape in moderate condition, demonstrating change, with some unspoilt characteristics and a moderate susceptibility to change.
Low District or local: generally undesignated landscapes which might be valued by the local community, containing elements or features that might benefit from restoration or enhancement.	A landscape not valued for its scenic quality, with a disparate combination of features, elements and characteristics and a weak sense of place. Few cultural associations. Mainly common features and few / no historic or ecological elements that contribute to landscape character. A landscape of low tranquillity, in poor condition, demonstrating a high degree of change and a low susceptibility to change.

Overall Landscape Receptor Sensitivity

- 12.4.49 The values for ‘susceptibility’ and ‘value’ are then considered together, by use of reasoned professional judgement, to derive an overall ‘sensitivity’ for each receptor.
- 12.4.50 The ‘sensitivity’ that is determined is not absolute and relates to the type of change that is proposed. As a particular landscape receptor may exhibit differing levels of ‘sensitivity’ a narrative commentary is provided, to describe and justify the indicative grading levels ascribed to that or the intermediate grading between them.

Visual Amenity

- 12.4.51 The baseline study identified potential local receptors in the area and designated or protected views which might be affected by the Project
- 12.4.52 The sensitivity of different receptors varies according to the interest they take in their visual environment, distance from the Project, viewing opportunity and duration. The visual receptors were categorised into the groups reflecting proximity to the Project and viewers’ expectations, as set out in Table 12-8 - Susceptibility of Visual Receptors, below.

Nature of Visual Receptors (Sensitivity)

- 12.4.53 GLVIA3 states that the nature of visual amenity receptors, commonly referred to as their sensitivity, should be assessed in terms of the combination of the susceptibility of the receptor (to the type of change proposed) with the value attached to the receptor.

Visual Receptor Susceptibility

- 12.4.54 As described in GLVIA3, the susceptibility of visual receptors to changes in visual amenity is a function of the “occupation or activity of people experiencing the view” and “the extent to which their attention is focussed on the views and visual amenity and their experience at particular locations.” Drawn from the guidance within GLVIA3 this is recorded as ‘high’, ‘medium’ or ‘low’ according to Table 12-8 - Susceptibility of Visual Receptors. As a particular visual receptor may exhibit differing levels of ‘susceptibility’ a narrative commentary is provided to describe the reasoned professional judgement used to justify the indicative grading level ascribed to that.

Table 12-8 – Susceptibility of Visual Receptors

Visual Susceptibility (Indicative)	Description / Typical Receptor Criteria
High	People engaged in outdoor recreation, whose attention / interest is likely to be focused on the landscape or particular views, including from public rights of way. Visitors to heritage assets or other attractions, where views of the surroundings are an important contributor to the experience. Communities where views contribute greatly to the landscape / townscape setting enjoyed by residents.
Medium	People engaged in outdoor recreation, whose attention / interest is not directly linked to the landscape or particular views, and who are not upon public rights of way. Communities where views contribute moderately to the landscape / townscape setting enjoyed by residents;

Visual Susceptibility (Indicative)	Description / Typical Receptor Criteria
Low	People engaged in outdoor sport / recreation which does not involve or depend upon appreciation of views of the landscape. Communities where views contribute little to the landscape / townscape setting enjoyed by residents.

Visual Receptor Value

- 12.4.55 GLVIA3 (paragraph 6.3.7) suggests that when considering the value of a view experienced, that account should be taken of recognition of the:

“Value attached to particular views, for example in relation to heritage assets, or through planning designations; and

Indicators of the value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision for their enjoyment (such as parking places, sign boards and interpretative material) and references to them in literature or art”

- 12.4.56 Drawn from the guidance within GLVIA3 this is recorded as ‘high’, ‘medium’ or ‘low’ according to Table 12-9 – Value of Visual Receptors, below. The ‘sensitivity’ that is determined is not absolute and relates to the type of change that is proposed. As a particular landscape receptor may exhibit differing levels of ‘value’ a narrative commentary is provided, to describe the professional judgement used to justify the indicative grading levels ascribed to that or the intermediate grading between them. Where intermediate ratings are given, e.g. ‘Low / Medium’, this indicates a grading that is both less than ‘Medium’ and more than ‘Low’, rather than one which varies across the range.

Table 12-9 – Value of Visual Receptors

Visual Value (Indicative)	Description
High	Views experienced by receptors are widely known, well frequented and / or promoted as a beauty spot / visitor destination. The cultural associations of the visual experience are recognised in art, literature or other media.

Visual Value (Indicative)	Description
	The view relates to the experience of other features, for example heritage assets.
Medium	Views experienced by receptors, whilst they may be valued locally, are not widely known. The views experienced have no strong cultural association.
Low	Views experienced by receptors have little / no recognised value. The public are unlikely to visit to experience the views available.

Overall Visual Receptor Sensitivity

- 12.4.57 The values for ‘susceptibility’ and ‘value’ are then considered together, by use of reasoned professional judgement, to derive an overall sensitivity for each receptor. The ‘sensitivity’ that is determined is not absolute and relates to the type of change that is proposed.

Identification of Potential Impacts

- 12.4.58 Impacts on the landscape resource may arise from changes to overall landscape character or to individual elements or features. Factors that may affect the magnitude of change (or magnitude of impact) to the landscape resource include:
- The extent of the loss of existing landscape elements.
 - The degree to which aesthetic or perceptual aspects of the landscape are altered by the removal of existing landscape components or the introduction of new ones.
 - The scale of the geographical area affected by the Project.
 - The duration and reversibility of the impact.

Table 12-10 – Magnitude of Change to the Landscape Resource

Visual Magnitude of Change (Indicative)	Description
High	Total loss or fundamental alteration to key landscape elements and / or addition of new features that substantially alter the character of the landscape.

Visual Magnitude of Change (Indicative)	Description
Medium	Partial loss or alteration to key landscape elements and / or addition of new features that form prominent new elements that are largely characteristic of their setting but alter the character of the landscape.
Low	Minor loss or alteration to landscape elements and / or addition of new features that form largely inconspicuous elements in the landscape, resulting in a detectable change in the character of the landscape.
Negligible	No change to, or very minor loss of landscape elements and / or additions of new features that do not alter the character of the landscape.

12.4.59 Factors that may affect the magnitude of change on visual amenity include the following:

- The context of the existing view / visual experience (for example if it is across a natural landscape or an industrial site).
- The extent to which the view / visual experience has been altered due to the loss / addition of features and the proportion of the view the Project would occupy.
- The scale and appearance of the Project and the degree of contrasting / integration with the existing view / visual experience.
- The distance of the visual receptor from the Project and the angle / position of view / visual experience.
- The duration and reversibility of the impact.

Table 12-11 – Magnitude of Change to Visual Amenity

Visual Effect (Indicative)	Description
High	The Project would be the dominant feature of the view in which other elements become subordinate.
Medium	The Project would be a noticeable feature of the view which is immediately apparent to the receptor.

Visual Effect (Indicative)	Description
Low	The Project would be perceptible but would not alter the overall balance of features and elements that comprise the view.
Negligible	The Project would result in an almost imperceptible change to the view.

Significance Criteria

- 12.4.60 The likely significance of effects have been considered for this PEIR and will be assessed in detail and reported in the ES by comparing the sensitivity of the receptor relative to the magnitude of change, and by considering the indicative criteria set out below, based on the guidance within GLVIA 3.
- 12.4.61 Significance of effects for Landscape and Visual amenity would be clearly defined and expressed as transparently as possible. Reasoned professional judgement has been applied to determine the significance of each effect in line with GLVIA3. The effects on landscape character or visual amenity are assessed on an increasing scale of neutral, slight, moderate or substantial (large). An effect that is assessed as moderate or major (shaded dark grey in the Table 12-12 Significance of Effects Scoring Matrix) is typically considered of sufficient scale to be material to the planning consideration and therefore significant, while effects assessed as minor or moderate (shaded light grey) may or may not be considered significant according to professional judgment.
- 12.4.62 The following matrix is used to help assess the significance of effects on the landscape resource and visual amenity.

Table 12-12 – Significance of Effects Scoring Matrix

	Sensitivity of the Receptor				
Magnitude	Very High	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate	Negligible
Medium	Major	Major to Moderate	Moderate	Minor to Moderate	Negligible

	Sensitivity of the Receptor				
Low	Moderate	Moderate	Minor to Moderate	Minor	Negligible
Negligible	Slight	Negligible	Negligible	Negligible	Negligible
No Change	None	None	None	None	None

Assumptions and Limitations

12.4.63 The following limitations and assumptions have been considered:

- ZTVs have been prepared for the AGIs and the Pump Facility to help identify Landscape and Visual receptors to these elements of the Project. The preparation of ZTVs is not considered necessary for the underground pipeline route given the reinstatement of the landscape following completion of the construction phase.
- Assessment, site work and photography has been undertaken from publicly accessible locations only - such as the public highway, public open spaces, publicly accessible recreational areas / visitor locations and PRowWs and where land access was agreed.
- Where distances are given, these are approximate (rounded to the nearest 10 m) between the nearest part of the Project and the nearest part of the receptor in question, unless explicitly stated otherwise. Distances to residential properties have been given to the dwelling itself and not the boundary of any associated garden or residential community open space.

12.5 Baseline Conditions

12.5.1 This section sets out the baseline data that will be collected and analysed as part of our understanding of the Project's Landscape and Visual context.

Existing Baseline

12.5.2 As stated within the Project Description, the Project has been divided into three geographic sections numbered 1 to 3 (see Chapter 2: Project Description and Volume 3 - Figure 2.1 for location of sections):

- Section 1 - Drax area to the River Trent.
- Section 2 – North Lincolnshire.
- Section 3 – East Riding of Yorkshire.

Landscape Designations

- 12.5.3 There are no National Parks or National Landscapes (NL) within the Study Area. The nearest designation of this type is the Lincolnshire Wolds NL which lies over 7 km to the south of the draft Order Limits. The potential future Yorkshire Wolds NL (currently under consideration by Natural England) would be over 10 km to the north of the draft Order Limits near Hull.

Landscape and Seascape Character Baseline

- 12.5.4 Published Landscape and Seascape Character Assessments (LCAs) supplemented by field work, would inform the identification of landscape character receptors for use in the LVIA. The existing character assessments and guidance documents that would be used in the preparation of the LVIA include NCA profiles and local landscape and seascape character assessment publications. See Volume 3 - Figure 12.3 for the array of national and local landscape character areas (LLCA) and types (LLCT) across the Study Area.

National Character Assessment (NCA)

- 12.5.5 Natural England has divided England into 159 distinct NCAs. Each is defined by a unique combination of landscape, biodiversity, geodiversity and cultural and economic activity. As shown on Volume 3 - Figure 12.5 – Landscape Character Areas, the Site spans across a number of NCAs as set out in the proceeding paragraphs. The key characteristics for each NCA are summarised in Table 12.1.1 in Appendix 12.1.

Section 1 - Drax area to the River Trent

- 12.5.6 This section falls within Humberhead Levels NCA 39.

Section 2 – North Lincolnshire

- 12.5.7 This section falls within Humberhead Levels NCA 39, Humber Estuary NCA 41, Lincolnshire Coast and Marshes NCA 42, Lincolnshire Wolds NCA 43, Central Lincolnshire Vale NCA 44 and Northern Lincolnshire Edge with Coversands NCA 45.

Section 3 – East Riding of Yorkshire

- 12.5.8 This section falls within Holderness NCA 40 and Humber Estuary NCA 41.

Regional Landscape Character Studies

- 12.5.9 A number of regional and local published character area studies exist for the Study Area, and the Local Landscape Character Types (LLCT) / Local landscape Character Areas (LLCAs) / Seascape Character Areas (SCA) are shown on Volume 3 - Figure 12.5 – Landscape Character Areas. Full details of each LLCA / LLCT currently represented within the representative viewpoints (in close proximity to the AGI locations) are summarised in Table 12.1.2 in Appendix 12.1.
- 12.5.10 The following Landscape and Seascape Character Assessments have been referenced:
- East Riding of Yorkshire Landscape Character Assessment (2005), published by East Riding of Yorkshire (Ref 12.17)
 - North Lincolnshire Landscape Character Assessment and Guidelines 1999 (updated in 2021) (Ref 12.18)
 - West Lindsey Landscape Character Assessment (1999) (Ref 12.19)
 - Seascape Characterisation around the English Coast, Natural England, July 2012 / East Inshore and East Offshore marine plan areas, Marine Management Organisation 2012 (Ref 12.20)
 - Selby Landscape Character Assessment (2019), published by Selby District Council (Ref 12.21)

Selby Landscape Character Assessment (2019)

- 12.5.11 The Selby Landscape Character Assessment (Ref 12.21) was published in 2019 by LUC and provided an updated, more detailed Local Character Assessment to that published in 1999. This was informed by the ten landscape character areas identified within the 1999 assessment, though not at the level of the previously defined Landscape Character Types (LCTs). The County-wide study (North Yorkshire and York Landscape Characterisation Project) defines 39 County (Regional) LCTs.
- 12.5.12 The following County (Regional) Landscape Character Types are within the draft Order Limits:
- River Floodplain
 - Levels Farmland

East Riding of Yorkshire Landscape Character Assessment (2005)

- 12.5.13 The East Riding of Yorkshire Landscape Character Assessment was published in 2015 by AECOM (Ref 12.15). This was carried out to bring the 2005 assessment up to date to inform the preparation and review of the East Riding Local Plan. A total of 23 Landscape character types have been identified in the East Riding and these have been split further into 81 landscape character areas.
- 12.5.14 The following County (Regional) LCTs are within the draft Order Limits:
- River Corridors
 - M62 Corridor
 - Open Farmland
 - Drained Farmland

North Lincolnshire Landscape Character Assessment and Guidelines (1999)

- 12.5.15 The North Lincolnshire Landscape Character Assessment and Guidelines (Ref. 12.15) was published in 1999 in support of the emerging North Lincolnshire Local Plan. A landscape assessment for the whole County was commissioned by the County Council, Ryedale District Council, Scarborough Borough Council and the Countryside Commission in 1995, the outcome of which was the publication 'Our Landscape, Today for Tomorrow', prepared by Gillespies. This document classified and defined the different landscapes of Humberside, subdividing the County into regional landscape character areas and local landscape types. 25 of these Landscape Types fell within the North Lincolnshire Council boundary.
- 12.5.16 The following County (Regional) LCAs are within the draft Order Limits:
- Trent Levels
 - Lincolnshire Edge
 - Vale of Ancholme
 - Lincolnshire Wolds
 - Lincolnshire Drift

West Lindsey Landscape Character Assessment (1999)

- 12.5.17 The West Lindsey Landscape Character Assessment was published in 1999 by Environmental Resources Management (12.16) in support of the review of the

West Lindsey Local Plan. West Lindsey is divided into four Broad LCAs: Trent Valley, the Lincolnshire Cliff, the Lincolnshire Clay Vale and The Wolds.

12.5.18 The following Broad County (Regional) LCAs are within the draft Order Limits:

- Lincolnshire Clay Vale
- The Wolds.

Seascape Characterisation around the English Coast

12.5.19 The study area falls within Character Area 6-Humber Waters as per Seascape Characterisation around the English Coast (Marine Plan Areas 3 and 4 and Part of Area Pilot Study), Natural England October 2012) (Ref 12.17).

Local Landscape Character Assessments and Associated Studies

12.5.20 These following lists the LCAs within each section of the draft Order Limits.

Section 1 – Drax area to the River Trent

12.5.21 This section falls within the following Local Authority Districts:

- Selby District Council
- East Riding of Yorkshire Council
- North Lincolnshire Council.

12.5.22 The Study Area spans across the following LCAs, as set out in the Selby Landscape Character Assessment (2019), published by Selby District Council (Ref. 12.21)

- Camblesforth Farmland
- Ouse Valley
- East Selby Farmland
- Derwent Valley
- Aire Valley

12.5.23 The Study Area spans across the following Landscape Character Areas, as set out in the East Riding of Yorkshire Landscape Character Assessment

12.5.24 (2005), published by East Riding of Yorkshire (Ref 12.14).

- Goole Fields
- River Aire Corridor, Gowdall to Snaith and River Ouse Reach
- Twin Rivers Farmland
- Derwent Valley, Barnby to Pocklington Canal Reach

- Howden to Bubwith Farmland
- M62 Corridor Hook to Pollington
- River Ouse Corridor, Howdon Dyke to River Trent Reach
- Howden to Bubwith Farmland

12.5.25 The Study Area falls within the 'Trent Levels' and Lincolnshire Edge LCA identified in the North Lincolnshire Landscape Character Assessment (Ref 12.19). Trent Levels has been subdivided into the following Local Landscape Types:

- Flat Drained Farmland
- Flat Drained Treed Farmland
- Elevated Wooded Farmland
- Flat Open Remote Farmland
- Industrial Landscape
- Open Island Farmland

Section 2 – North Lincolnshire

12.5.26 This section falls within the following Local Authority Districts:

- North Lincolnshire Council
- West Lindsey District Council

12.5.27 The Study Area falls within the 'Trent Levels' LCA identified in the North Lincolnshire Landscape Character Assessment (Ref 12.15). Trent Levels has been subdivided into the following Local Landscape Types:

- Flat Drained Farmland
- Industrial Landscapes

12.5.28 The following LCAs are within North Lincolnshire Landscape Character Assessment and Guidelines 1999 (Ref 12.15) 'Lincolnshire Edge' Regional Landscape Character Area:

- Elevated Open Farmland
- Elevated Wooded Farmland
- Wooded Scarp Slope

12.5.29 The following LCAs are within North Lincolnshire Landscape Character Assessment and Guidelines 1999 (Ref 12.15) 'Lincolnshire Drift' Regional Landscape Character Area:

- Open Undulating Farmland

- Wooden Farmland
- Flat Open Farmland

12.5.30 The following LCAs are within North Lincolnshire Landscape Character Assessment and Guidelines 1999 (Ref 12.15) 'Lincolnshire Wolds' Regional Landscape Character Area:

- Open Farmed Scarp Slope
- Open Rolling High Farmland

12.5.31 The West Lindsey Landscape Character Assessment was published in 1999 by Environmental Resources Management (Ref 12.16) in support of the review of the West Lindsey Local Plan. West Lindsey is divided into four Broad LCAs: Trent Valley, the Lincolnshire Cliff, the Lincolnshire Clay Vale and The Wolds.

12.5.32 The following Broad County (Regional) LCAs are within the draft Order Limits:

- Lincolnshire Clay Vale
- The Wolds.

Section 3 – East Riding of Yorkshire

12.5.33 This section falls within the following Local Authority Districts:

- East Riding of Yorkshire Council
- North Lincolnshire Council

12.5.34 The following LCAs are within the East Riding of Yorkshire Landscape Character Assessment (2005), published by East Riding of Yorkshire (Ref 12.15). 'Drained Farmland' Regional Landscape Character Area:

- Paull Farmland
- South Patrington, Ottringham and Keyingham Farmland
- Sunk Island

12.5.35 The following LCAs are within the East Riding of Yorkshire Landscape Character Assessment (2005), published by East Riding of Yorkshire (Ref 12.14). 'Farmed Urban Fringe' Regional Landscape Character Area:

- Headon, Preston and Bilton Farmland

12.5.36 The following LCAs are within the East Riding of Yorkshire Landscape Character Assessment (2005), published by East Riding of Yorkshire (Ref 12.15). 'Open Farmland' Regional Landscape Character Area:

- Burstwick to Withernsea Farmland

12.5.37 The following LCAs are within the East Riding of Yorkshire Landscape Character Assessment (2005), published by East Riding of Yorkshire (Ref 12.15). 'Coast Farmland' Regional Landscape

- Withernsea to Spurn Coast

Landscape Features and Elements

12.5.38 The array of NCAs, LLCAs and LLCTs that the Study Area spans across are shown in Volume 3 - Figure 12.5: Landscape Character Areas.

12.5.39 The majority of the land within the Study Area is in agricultural as well as industrial use, and as such the landscape is primarily semi-rural in character. The topography of the landscape is a primary influence in defining changes in character. The landscape character of the Study Area can be broadly described in terms of the following key characteristics:

- Low lying, flat, open, broad-floodplain and estuarine influenced landscape of the Humberhead Levels, including the River Ouse.
- Levels, including the River Ouse.
- Expansive, low lying, open and level farmland flanking the River Trent.
- Wooded scarp slopes and areas of urbanisation around Scunthorpe.
- Exposed and gently undulating wooded landscape elevated around Kirmington.
- Parkland type landscape of the Wolds Estates including Brockelsby Estate.
- Industrial and residential areas on the outskirts of Hull and Salt End, and
- Exposed coastal landscape around Easington

12.5.40 Although primarily semi-rural, there are a number of urbanising elements within, and immediately adjacent to, the Study Area which influence the character of the rural landscape to varying degrees, depending upon their scale and prominence within the landscape. These include:

- Large scale energy infrastructure at Drax Power Station at the north-western end of the Study Area and Easington Gas Terminal at the eastern end of the Study Area.
- Wind energy development including wind farms at various locations throughout the route.
- Overhead power lines and associated pylons which form linear features at a number of locations along the route (mainly to the outskirts of Drax, and Killingholme).

- A small number of medium to large scale power stations and industrial estates including Killingholme Power Station and Salt End Power Station and Chemical Park.
- Major transport routes, including railway lines, motorways and a number of 'A' Roads.
- The edge of major towns and cities, including Hull, and a number of small settlements, including Drax, Goole, East Halton, North Killingholme, Paull, Hedon and Easington.
- Caravan Parks along the North Sea Coast, including at Easington.

12.5.41 Tree cover is generally sparse over the route and limited to hedgerows and small woodland copses.

12.5.42 There are numerous National Trails, long distance paths and PRowWs within the Study Area including:

- Peatlands Way Long Distance Path
- Viking Way Long Distance Path
- Trans Pennine Trail
- England Coast Path National Trail (Future Proposed Route)

12.5.43 There are numerous watercourses within the Study Area including:

- River Ouse.
- River Aire.
- Aire and Calder Navigation.
- River Trent.
- River Ancholme, and
- River Humber.

Visual Baseline

Visual Character

12.5.44 The Study Area lies within a generally open, expansive, and low-lying landscape. The landform is predominantly flat, with large-scale arable fields contributing to a strong sense of openness and exposure. Tree cover is generally limited, comprising sparse shelterbelts, occasional hedgerows, and small pockets of woodland associated with farmsteads and settlements, offering only localised visual enclosure. The landscape is interspersed with a range of large- and medium-scale infrastructure elements, particularly related to energy (pylons, wind turbines, and power generation facilities), transport corridors (road, rail, and river), and port infrastructure (jetties, cranes, and cargo vessels).

The proximity of the River Humber introduces a strong coastal and maritime influence, with expansive mudflats, flood defences, and wide estuarine views contributing to the area's visual character. While built form and occasional vegetation can limit intervisibility in some locations, long-distance views remain prevalent across much of the area due to the flat topography and low levels of visual screening.

- 12.5.45 Views within the Study Area predominantly encompass undesignated rural farmland and the estuarine landscape. Built form and other human influences, including industrial areas, are intermittently visible within the wider landscape.

Visual Receptors and Sensitivity

- 12.5.46 The following potential visual receptors have been identified through a combination of desk-based analysis, field survey, and detailed Zone of Theoretical Visibility (ZTV) mapping. These receptors represent groups likely to experience views of the Project, particularly in proximity to the AGI locations.

Recreational Users

- 12.5.47 The susceptibility of recreational users of the PRow network and recreational open spaces to changes arising from the Project is considered high, as views of the surrounding countryside are likely to be a key part of their enjoyment. The value of views is likely to vary between medium and high. Consequently, the overall sensitivity of PRow users is likely to be high. Specific receptors identified within this receptor group, which have the potential to be impacted by the Project, include:

- Users of promoted Yorkshire Wolds Way National Trail and long-distance paths (such as the Viking Way and the Trans Pennine Trail).
- Users of PRowS, and locally known walks (such as the Alkborough Trail along the Trent Cliff).
- Users of National Cycle Routes (NCRs).
- Users of waterways and the paths alongside them (such as the River Humber, River Aire, River Ouse, and River Trent, and the Aire and Calder Navigation and Stainforth and Keadby Canal).
- Visitors to known attractions (such as Thornton Abbey and the Registered Park and Garden of Brocklesby Park – albeit the impact upon the setting of such heritage assets is covered in Chapter 11: Cultural Heritage).
- Visitors to the scenic Barton Railway Line (between Barton upon Humber – Cleethorpes).
- Users of publicly accessible open space including:

- Open access land defined in the CROW Act 2000 (such as Cow Lane, Ousefleet Cow Gaits and Whitgift Cow Gaits).
- Beaches and foreshore (such as Easington Beach).
- Visitors to well-known and promoted viewpoints (such as at Paull).

Residential Communities

12.5.48 Specific receptors identified within this receptor group, which have the potential to be impacted by the Project, include:

- Existing Settlements
- Occupiers of nearby individual residential properties

Representative Viewpoints

12.5.49 A selection of Representative Viewpoints (RVPs) has been used to assess impacts on the visual receptors identified above. The list of visual receptors and a description of corresponding viewpoint photography which represents baseline visual conditions from the identified RVPs is set out in Table 12-13. The location of the viewpoint photographs is shown on Volume 3 - Figure 12.6 - Visual Amenity and Representative Viewpoints Plan with the viewpoint photographs in Appendix 12.2: Viewpoint Photographs.

12.5.50 Viewpoint locations have been selected, where relevant, to represent a range of visual receptor types, including users of Public Rights of Way (PRoW), public highways, Open Access Land, recreation grounds, and residents within or on the edge of settlements. Where reasonably possible, the locations have been chosen to reflect the likely experience of these receptors at relevant distances and directions from the Project, and to be representative of the receptor type(s) likely to be present at each location.

12.5.51 Para 6.31 of GLVIA3 makes clear that it is not the viewpoint itself that forms the basis of the assessment, but the visual receptor — that is, the person or group of people likely to be affected by the Project when viewed from that location. The guidance states:

“Each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, should be assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views.”

This principle is further reinforced in response to Question 44 of the Landscape Institute’s Technical Information Note 01/21 – GLVIA Webinar Q&As (Ref 12.19), which confirms that:

“The focus of the visual assessment should be the visual receptors, not viewpoints.””

- 12.5.52 Table 12-13 presents the locations of the viewpoints for the assessment in this PEIR as well as the receptors represented by them, and their sensitivity. These 35 viewpoints were chosen to be developed as Type 1 visualisations (Type 1 as described in LI Guidance – TGN 06/19 Visual Representation of development proposals). These are generally located near to AGIs and are of sensitive value due to their landscape, visual and heritage considerations and are therefore considered to be a fair representation at this stage.
- 12.5.53 Viewpoints have been specifically selected in proximity to the proposed AGIs, where operational development would result in ongoing physical and visual presence in the landscape. No viewpoints have been specifically selected solely along the underground pipeline route, as it would not result in operational landscape or visual effects once the construction phase is complete, although the pipeline route is captured / included where it connects to an AGI. The selected viewpoints are considered appropriate and proportionate to inform the PEIR.

Table 12-13 – Representative Viewpoints and Baseline Descriptions

Viewpoint Reference	Receptors	Description of View	Distance from AGI / draft Order Limits
Section 1 – Drax area to the River Trent			
RVP 01 (Drax 03) Trans Pennine Trail / PRoW 35.35/6/1	Receptors include users of local PRoW, and residents at Drax Abbey Farm.	Southerly direction of view with Camblesforth Farmland LLCA within the view. This view is relatively industrial in character, populated by many vertical energy infrastructure features, but also featuring large skies. Cooling towers at Drax Power Station form the focus of the view and feature in the centre of the middle ground. Numerous buildings associated with the power station, and pylons, punctuate the skyline in the background of the view where overhead lines run horizontally across the sky. In the foreground, the Trans Pennine Trail runs along the grass bank of the River Ouse, which features banks of riparian vegetation either side of it. Swathes of amenity grassland, separate the river from Drax Power Station. Overall, the landform is relatively flat either side of the river, although the topography rises in the distance, with a shallowly sloping treed hill in the background to the right of the view. Layers of mixed of tree and shrub planting are scattered throughout the view, these partially filter views towards the base of Drax Power Station and elsewhere form the backdrop of the view.	1.17 km
RVP 02 (Rawcliffe Bridge 01) Moor Road	Receptors include users of the local road network.	Easterly direction of view with M62 Corridor Hook to Pollington LLCA within the view. Far reaching view across a flat and open arable landscape, with large skies. Tree planting is limited to that background of the view, forming the horizon in the distance. Wind turbines and electricity poles are interspersed throughout the view. Ditches form field boundaries and allow for clear intervisibility between fields.	0.8 km
RVP 03 (Rawcliffe Bridge 02) Moor Road / Hinchcliffe Farms	Receptors include users of local PRoW and local road users (cyclists).	Northerly direction of view with M62 Corridor Hook to Pollington and Goole Fields LLCAs within the view. Far reaching view across a flat and open arable landscape, with large skies. Tree planting is limited to the background of the view, forming the horizon in the far distance. Occasional wind turbines and other tall electrical infrastructure elements are visible in the background and break the skyline. Ditches form field boundaries and allow for clear intervisibility between fields and local road network.	1.14 km
RVP 04 (Eastoff 01) Quay Lane	Receptors include local road users (cyclists).	Southerly direction of view with Thin Rivers Farmland LLCA within the view. Large expanse of open arable farmland in the foreground, which is bounded by a ditch alongside the road. Turbines at Goole Fields windfarm are visible in the south-west of the view. Hedgerows and tree planting form the backdrop to this view in the middle distance. Views are further reaching to the east and in the centre of the view, where a mix of agricultural building, occasional trees and hedgerows form the backdrop in the distance. The skyline of the view is interspersed with wind turbines, and electrical transmission poles throughout.	0.43 km
RVP 05 (Eastoff 02) Quay Lane	Receptors include local road users (cyclists).	Westerly direction of view with Thin Rivers Farmland LLCA within the view. Views experienced from this location feature open, flat arable farmland in the foreground, edged by ditches which run alongside the local road network, allowing for wide open vistas, with large skies, and a skyline comprising mixed tree planting and hedgerows stretching across the horizon. Numerous wind turbines, and several electricity poles (and the associated overhead line) also characterise this view; featuring in the background and middle distance, to the west / south-west, breaking the skyline.	0.26 km
RVP 06 (Keadby 01) PRoW 10	Receptors include users of local PRoW, local road users and residents at	Westerly direction of view with Industrial Landscape LLCA within the view. Flat landscape with large open arable field in the foreground and windfarms and turbines dominating the skyline. Built elements associated with Keadby Power Station form the backdrop to the south of the view.	1.16 km

Viewpoint Reference	Receptors	Description of View	Distance from AGI / draft Order Limits
	the northern extents of Keadby.		
RVP 07 (Keadby 02) PRoW 9 / Keadby Wind Farm	Receptors include users of local PRoW and local road users (cyclists).	South-east direction of view with Flat Drained Farmland LLCA within the view. Close range view of Keadby Windfarm which sits within a flat landscape with large open field in the foreground and windfarms and turbines dominating the skyline and feature heavily within this view. Built elements associated with Keadby Power Station form the visual backdrop to the south-east.	0.97 km
RVP 08 (Keadby 03) PRoW 11 / Ealand Poultry Farm	Receptors include users of local PRoW and local road users (cyclists).	Easterly direction of view with Flat Drained Farmland LLCA within the view. Views experienced from this location feature open, flat arable farmland in the foreground, edged by ditches which run alongside the local road network, allowing for wide open vistas, with large skies. Wind turbines at Keadby Windfarm are scattered throughout the view, and a landscape bund in the background of the view screens visibility of Keadby Power Station, which would otherwise sit in the centre of the view. Pylon and overhead power lines are visible in the distance, stretching north and southwards.	1.65 km
Section 2 – North Lincolnshire			
RVP 09 (Winterton 01) Edge of Winterton village	Receptors include local road users and residents at the southern edge of Winterringham.	South-west direction of view with Elevated Open Farmland LLCA within the view. Far reaching view across largely flat, open arable farmland, with fields edged by ditches and allowing intervisibility between each other and the local road network. Several pylons can be seen stretching across the skyline in the distance, occasionally interspersed with tree planting.	1.45 km
RVP 10 (Winterton 02) Cliff Road / PRoW 312	Receptors include local road users (cyclists). and users of the local PRoW.	South direction of view with Elevated Open Farmland LLCA within the view. Far reaching view across gently undulating, open arable farmland, with fields edged by ditches and allowing intervisibility between each other and the local road network. Several pylons can be seen stretching across the skyline in the distance.	1.09 km
RVP 11 (Winterton 03) Edge of West Halton village / PRoW 21	Receptors include users of the local PRoW and residents at West Halton.	East direction of view with Elevated Wooded Farmland LLCA within the view. Long distance view across undulating arable farmland consisting of a network of rectilinear fields bounded by gappy hedgerows. Shelter belts and small blocks of woodland are visible on the horizon. Several pylons and associated overhead lines feature in the background of the view.	1.47 km
RVP 12 (Barrow 01) Burnham Road / PRoW 330	Receptors include users of local PRoW and residents at Deepdale Farm.	North-east direction of view with Open Rolling High Farmland LLCA within the view. View across a gently undulating landscape of rectilinear arable fields bounded by low hedgerows and occasional trees. A rural road can be seen in the foreground, and telegraph lines stretch across the sky.	0.82 km
RVP 13 (Barrow 02) Caistor Road	Receptors include local road users (cyclists).	South-east direction of view with Open Rolling High and Open Undulating Farmland LLCAs within the view. View across a gently undulating landscape of rectilinear arable fields bounded by low hedgerows and occasional trees. The rural road network can be seen in the foreground. Views from this location are far reaching towards wooded valleys and open hilltops in the distance, and with occasional telegraph poles throughout the view.	2 km

Viewpoint Reference	Receptors	Description of View	Distance from AGI / draft Order Limits
RVP 14 (Barrow 03) Caistor Road / B1206	Receptors include local road users (cyclists). and residents at Barrow Vale.	Southerly direction of view with Open Rolling High Farmland LLCA within the view. Mid-range views across a gently undulating arable field. Hedgerows and tree planting along the field boundary prevent much visibility into the neighbouring landscape, although a handful of pylons are just about discernible along the skyline, in the distance.	0.62 km
RVP 15 (Barrow Compound 01) A15/Viking Way / PRoW 34	Receptors include users of local PRoW network / Viking Way.	North-easterly direction of view with Open Rolling High Farmland LLCA within the view. Far reaching open view across very gently undulating landscape of arable field network, divided by low and often gappy hedgerows. Occasional small blocks of woodland and shelterbelts are visible near the horizon, with a handful of pylons visible in the far distance on the left-hand side of the view.	3.31 km
RVP 16 (Croxtan 01) PRoW 109 / Ladypits Plantation	Receptors include users of local PRoW and visitors to Yarborough Camp large univallate hillfort (Scheduled Monument).	Did not have land access for this viewpoint for the PEIR site survey. Will prepare and report in the ES the results of a winter photography survey.	1.57 km
RVP 17 (Croxtan 02) PRoW 109	Receptors include users of local PRoW and local road users (cyclists).	South-west direction of view with Open Farmed Scarp Slope LLCA within the view. Far reaching view across a shallowly undulating landscape, with open arable fields in the foreground, and PRoW 109 to the north-west. A swathe of tree planting stretches across the valley in the middle distance of the view, screening and/or filtering visibility of much of the development at Croxtan, although the tops of some residential buildings can still be seen. Distant hilltops form the horizon, and structures associated with Melton Ross Quarry are visible in the far distance; this sits at a local high point and breaks the skyline. Small electrical poles and overhead lines run alongside PRoW and extend into the distance.	1.54 km
RVP 18 (East Halton 01) Thornton Abbey / PRoW 82	Receptors include users of local PRoW, local road users (cyclists). and visitors to Thornton Abbey Scheduled Monument.	North-east direction of view with Wooded Farmland LLCA within the view. Views here look across a shallowly undulating open landscape associated with the grounds of Thornton Abbey. Mixed tree planting, which includes garden and evergreen species form the skyline of the view in the middle distance, through which occasional residential buildings can be glimpsed.	0.48 km
RVP 19 (East Halton 02) College Road / PRoW 76	Receptors include users of local PRoW and local road users (cyclists).	North-west direction of view with Wooded Farmland LLCA within the view. Far reaching view across a shallowly undulating landscape, with open, rectilinear arable fields in the foreground and middle distance, edged by low and gappy hedgerows, which allow for visibility between fields. Buildings associated with South End Farm can be glimpsed between tree planting along the skyline. A stretch of woodland extends along the eastern portion of the view, restricting views north-east.	0.27 km
RVP 20 (East Halton 03) PRoW 760	Receptors include users of local PRoW.	South-east direction of view with Wooded Farmland and Open Undulating Farmland LLCAs within the view. Far reaching view across a shallowly undulating landscape, with open, rectilinear arable fields in the foreground, against a backdrop of mixed tree planting, and woodland block in the east.	0.75 km

Viewpoint Reference	Receptors	Description of View	Distance from AGI / draft Order Limits
RVP 21 (Killingholme 01) Church Lane	Receptors include local road users (cyclists). and residents at the eastern edge of North Killingholme.	North-east direction of view with Wooded Farmland LLCA within the view. Industrial view across a flat landscape which is largely dominated by Killingholme Power Station, with numerous chimneys punctuating the skyline. Hedgerow and tree planting in the foreground of the view provide some visual screening of the lower elements of the power station.	0.12 km
RVP 22 (Killingholme 02) Chase Hill Road	Receptors include local road users (cyclists).	South-west direction of view with Open Undulating Farmland LLCA within the view. Industrial view of a flat landscape which is dominated by Killingholme Power Station to the left-hand side of the view, and pylons and overhead lines to the right. A swathe of open farmland separates the two and stretches out towards the horizon, where groups of tree planting can be seen in the distance.	0.93 km
RVP 23 (Immingham 01) PRoW 177 / PRoW 1 / PRoW 51	Receptors include users of local PRoW and local road users (cyclists).	South-east direction of view with Open Undulating Farmland LLCA within the view. View across gently undulating arable farmland, with fields in the foreground edged by ditches. Mixed woodland forms much of the backdrop to the view. An isolated telegraph pole can be seen in the left-hand side of the view, with overhead lines extending into the distance.	0.24 km
RVP 24 (Immingham 02) PRoW 1 / Killingholme Road	Receptors include users of local PRoW, local road users (cyclists) and residents at the southern edge of South Killingholme.	North-east direction of view with Open Undulating Farmland LLCA within the view. View across gently undulating arable farmland, with fields in the foreground edged by ditches, allowing intervisibility across the farmland and local road network. Industrial structures associated with Killingholme Power Station and Glebe Farm are visible in the background of the view, against a wooded backdrop in the distance. Telegraph poles run along Killingholme Road which sits to the right of the view and extends towards the horizon.	0.84 km
Section 3 – East Riding of Yorkshire			
RVP 25 (Salt End 01) Public footpath PAULF05 / River Humber	Receptors include users of local PRoW and residents at northern end of Paull.	Northerly direction of view with Paull Farmland LLCA within the view. This is an industrial riverside view which extends into the middle distance. The backdrop of the view, and skyline, features numerous structures of varying shapes and sizes associated with Salt End Power Station, and jetties which extend out across the River Humber to the west. The edge of the River Humber, a low stone bank next to which PRoW PAULF05 runs, and an open expanse of grassland occupy the foreground.	0.28 km
RVP 26 (Salt End 02) Public footpath PAULF05 / Hedon Haven	Receptors include users of local PRoW and local Road users (cyclists).	South-west direction of view with Paull Farmland LLCA within the view. View across a largely flat and open grassed landscape with large skies. The Hedon Haven watercourse can be seen in the west of the view, with Salt End Jetties extending over the water. The edge of development at Salt End is visible in the distance, on the left hand side of the view.	0.07 km
RVP 27 (Salt End 03) Hedon Road	Receptors include users of local and local road users (cyclists) of Hedon Road and residents of	South-west direction of view with Paull Farmland LLCA within the view. View across a largely flat and open grassed landscape with large skies. The proposed construction compound can be seen west in the view and is lined by a row of trees on its east along Hedon Road. The Hedon Haven watercourse is visible in the background with The Hedon Haven watercourse can be seen in the east of the view, with Salt End Jetties extending over the water.	1.32 km

Viewpoint Reference	Receptors	Description of View	Distance from AGI / draft Order Limits
	Battery cottage and Business Park / Warehouse on Hedon Road		
RVP 28 (Thorngumbald 01) Public footpath PAULF03 / Newlands Lane	Receptors include users of local PRow, local road users (cyclists), and residents at Oxbodess Farm.	Southerly direction of view with South Patrington, Ottringham and Keyingham Farmland LLCA within the view. Mid-range view across rectilinear arable fields bounded by ditches and low / gappy planting which allows for intervisibility with neighbouring farmland and the local road network. View is rural in nature, with gently undulating landform. Shelterbelts and block of woodland are visible in the background, along the skyline.	0.81 km
RVP 29 (Thorngumbald 02) Public footpath PAULF06 / England Coast Path	Receptors include users of local PRow, England Coastal Path, and recreational visitors to Paull Holme moated site and tower.	South-east direction of view with South Patrington, Ottringham and Keyingham Farmland LLCA within the view. View across open wetland landscape (Paull Holme Nature Reserve) which appears largely flat / only gently undulating. Tree planting and other vertical features limited to the far distance of the view, forming the horizon.	1.45 km
RVP 30 (Thorngumbald 03) Public footpath PAULF06 / England Coast Path	Receptors include users of local PRow and England Coastal Path.	East direction of view with South Patrington, Ottringham and Keyingham Farmland LLCA within the view. View across open wetland landscape (Paull Holme Nature Reserve) which appears largely flat / only gently undulating. Tree planting and other vertical features limited to the far distance of the view, forming the horizon.	0.79 km
RVP 31 (Patrington 01) Public bridleway WELWB02	Receptors include users of local PRow network.	South-west direction of view with Burstwick to Withernsea Farmland LLCA within the view. The view features open arable farmland stretching across the foreground, and large skies, with little in the way of vertical features. Visibility is far reaching across a flat landscape. Farm buildings at Greenland Farm and Little Plowland sit in the background of the view, against a backdrop of tree planting and low hills in the distance. The spire of St Patricks church at Patrington can be seen amongst these.	0.24 km
RVP 32 (Patrington 02) Public footpath PATRF07	Receptors include users of local PRow and residents at Eastfield House and Eastfield Bungalow.	North-east direction of view with Burstwick to Withernsea Farmland LLCA within the view. This view comprises a flat rural landscape with large skies. A hedgerow and occasional deciduous tree planting feature in the background and form the horizon. The foreground comprises an area of arable field with tree planting along the boundary.	0.53 km
RVP 33 (Patrington 03)	Receptors include users of local PRow and local road users (cyclists).	North-west direction of view with Burstwick to Withernsea Farmland LLCA within the view. This view comprises flat arable farmland in the foreground, edged to the west by a tall deciduous hedgerow and tree planting, against which PRow WELWF01 runs. Views from this location are far reaching. The land gradually falls away towards the background then rises	1.09 km

Viewpoint Reference	Receptors	Description of View	Distance from AGI / draft Order Limits
Beacon Hill / Public footpath WELWF01		up again, allowing for views to the ridge line in the distance. Farm buildings and agricultural structures associated with Little Plowland feature in the background of the view, and telephone wire and poles stretch out into the distance.	
RVP 34 (Easington 01) Holmpton Road / PRoW EASIF02	Receptors include users of local PRoW, local road users (cyclists) and residents at High Grange and Model Farm.	South-east direction of view with Withernsea to Spurn Coast LLCA within the view. Windfarms are a dominant feature stretching across this flat grassed landscape, along with pylons and occasional buildings along the skyline. The view also features large skies and hedgerows along field boundaries.	1 km
RVP 35 (Easington 02) Easington Road / Out Newton Road	Receptors include users of local PRoW, and local road users (cyclists).	North-east direction of view with Withernsea to Spurn Coast LLCA within the view. Windfarms are a dominant feature stretching across this landscape, which is flat in the foreground, but begins to slowly rise towards the background. Farmland in the foreground is edged by a mix of hedgerows or ditches which allow for clear intervisibility between the farmland and adjacent road networks.	2 km

Future Baseline

- 12.5.54 The baseline described is predominantly that which presently exists in the Study Area. It is acknowledged, however, that given the length of time which would elapse before the Project's construction begins (2028), it becomes operational (2032), and any potential associated landscape mitigation (structural planting) is reasonably considered to have established (2047), the baseline conditions may change irrespective of the Project occurring. The 'future baseline', therefore, relates to known or anticipated changes to the current baseline.
- 12.5.55 The 'future baseline' has been considered when making judgements upon the degree by which landscape character and / or visual amenity may change as a result of the Project.
- 12.5.56 During the time period of the Project's planned construction, operation and decommissioning it is anticipated that most of the existing features that constitute the surrounding landscape of the LVIA Study Area would remain and the current predominantly agricultural land use would continue to exist.
- 12.5.57 Ash (*Fraxinus excelsior*) trees within the LVIA Study Area are likely to be impacted by ash dieback. This is a disease of ash trees caused by a fungus *Hymenoscyphus fraxineus* (*H. fraxineus*; formerly called *Chalara fraxinea*). The disease causes leaf loss and crown dieback in impacted trees and is usually fatal. Mapping by the Forestry Commission confirms the presence of ash dieback in the River Humber area. The future baseline therefore assumes that there would be loss of ash trees in the long term across the LVIA Study Area, but that other tree species would occupy gaps created in the long term, and eventually levels of vegetation would remain similar to existing.
- 12.5.58 In contrast to the expected loss of ash trees, some positive landscape changes are also anticipated. These relate to agri-environment and woody species planting schemes which will continue to enhance the landscape. These include the measures associated with emerging Environmental Land Management schemes which are replacing the European Union's Common Agricultural Policy in England.
- 12.5.59 Consideration of the future baseline is also related to third-party consented development proposals which are not yet present in the landscape but are expected to be constructed, which may affect the landscape character or result in changes to visual amenity and views. These will be reported in the ES.

- 12.5.60 The ES will report a Landscape and Visual cumulative assessment which will include those developments that are similar in nature, scale and form to the Project, such as those associated with energy generation and transmission, large industrial / commercial buildings (i.e. with a footprint of over 1,500 m²), linear infrastructure (e.g., roads and railways), or large residential projects (i.e. over 25 units).

12.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development, Impact Avoidance and Embedded Mitigation

- 12.6.1 Primary and tertiary mitigation measures are described below, however, secondary mitigation measures would be developed and reported in the ES.
- 12.6.2 The primary mitigation measures include the trenchless crossing of major infrastructure and watercourses which would avoid direct physical impact to those identified as landscape features within the draft Order Limits.
- 12.6.3 Tertiary mitigation measures include the production of a Construction Environmental Management Plan (CEMP) which would capture good practice construction working activities. This would include dampening down of loose material to reduce dust, traffic management practices, and waste management. This would support reducing potential impacts to landscape features from construction related activity.
- 12.6.4 Mitigation measures associated with the reduction of potential adverse impacts on landscape character and visual amenity have involved two key objectives; considered design process and appropriate landscape reinstatement.
- 12.6.5 As described in detail in Chapter 3: Consideration of Alternatives, the selection and refinement of the route to minimise disturbance to the landscape has been an integral part of the design process. During this process, Landscape and Visual constraints have been considered to minimise and, wherever possible, avoid direct impacts on designated sites and important landscape features. As a result, the route has been aligned to:
- Avoid areas of woodland where possible.

- Avoid removal of any trees covered by Tree Preservation Orders at the time of submission (Arboricultural Survey to be undertaken pre-construction).
- Minimise loss of mature trees wherever possible, particularly within areas of more sensitive landscapes.
- Reduce the number of field boundary crossings and disruption to the recreational footpath network, as far as is practical for a linear Project of this length and type.
- Avoid proximity to well settled areas and the larger urban centres within the region and locate the route outside of settlement boundaries along its length.
- Avoid direct impacts on designated areas of historic landscape value.
- Avoid direct and indirect impacts on landscape features designated for their Cultural Heritage value such as Conservation Areas, Listed Buildings and Scheduled Monuments.

12.6.6 Additional avoidance measures would typically be considered during design and prior to construction, based on detailed walk-over surveys, which would aim to:

- Identify sensitive crossing points at field boundaries and features of landscape importance (e.g. watercourses) to minimise damage.
- Identify specific trees or hedgerow sections to be protected and retained.
- Minimise hedgerow, or watercourse crossings and maximise the use of existing opportunities (e.g. use of existing crossing points and gaps in hedges).
- Minimise vegetation loss by selecting less vegetated sections of linear features.

Mitigation During Construction

12.6.7 Any night-time lighting would be sympathetically planned and positioned in locations close to sensitive receptors. Directional lighting would also be used to minimise glare beyond the construction working area or compound.

12.6.8 The routing of pipelines would follow British Standards (BS) BS5837:2012 (Ref. 12.20) and arboricultural surveys in order to ensure they are aligned to avoid mature features such as individual trees and their root systems. Where it is necessary to impact on features such as field and roadside boundary hedgerows and ditches the working areas should be kept to the minimum to limit the length to be removed or disrupted.

- 12.6.9 On completion of a single construction activity or a sequential series of activities in a particular location, the re-instatement of affected landscape features, including reinstatement of ground contouring, would be implemented as soon as practicable during the next favourable season, so that restoration works would be carried out over a phased implementation programme. The reinstated features would as a minimum be of similar quality to the feature removed where practical to do so. Every opportunity would be considered to provide new features of enhanced quality.
- 12.6.10 Construction compounds are proposed to be located within areas of limited population or on previously developed sites where existing views of the landscape are influenced by existing urbanising features including large scale industrial / commercial development, thereby reducing the sensitivity of the landscape to a temporary change of the type proposed.
- 12.6.11 Land disturbed to make way for construction compounds would be reinstated and returned to existing land uses following completion of the construction phase of the Project.
- 12.6.12 Similarly to the pipelines, mitigation measures associated with the reduction of potential adverse impacts of the AGIs on landscape character and visual amenity have involved two key objectives; considered location / siting and appropriate landscape integration.
- 12.6.13 As described in Chapter 3: Consideration of Alternatives, carefully considered site selection of the AGI locations has been undertaken to minimise disturbance to the Landscape and Visual resource. During this process, Landscape and Visual constraints have been considered to minimise and, wherever possible, avoid direct impacts on designated sites and important landscape features. In relation to Landscape and Visual considerations, the AGIs have been located to:
- Avoid direct impacts on designated and locally valued landscape features, including woodland, hedgerows, and field drains, by siting AGIs outside of these areas, including root protection zones of existing mature trees.
 - Avoid locations which are prominent within the landscape, to minimise their influence on the landscape setting and potential visual impacts.
 - Seek opportunities to integrate the AGIs into the landscape setting through secondary landscape measures, such as tree and hedgerow planting, by locating them within vegetated landscapes and / or enclosed sites wherever possible.

- Utilise existing visual screening, through location in close proximity to areas of woodland, and / or locally enclosed topography, such as valley bottoms, or hills.
- Minimise potential for visual intrusion by locating AGI sites away from larger settlements, and outside of all settlement boundaries.

- 12.6.14 Further to the considered siting of the AGIs, planting design will be reported in the ES for each AGI to help integrate these AGIs into the landscape setting of the Study Area. These will be incorporated into the Design Approach Document which will accompany the DCO application and will outline the nature of these measures.
- 12.6.15 Site specific measures will be developed with reference to opportunities outlined in the various landscape character assessments relevant to the landscape of the Study Area.

Mitigation After Construction Completion

- 12.6.16 Following construction, the only permanent works would comprise the buried pipelines and the AGIs. In Landscape and Visual terms, land within the pipelines spread would be returned to its original use with hedgerows and trees reinstated where appropriate and in consideration of future access requirements. The reinstated hedgerows would take up to ten to fifteen years to become established and develop to a comparable size and density as the hedgerows which were removed.
- 12.6.17 Landscape and Visual impacts have been considered as an inherent part of the design process. The main areas for mitigation are associated with the AGIs where screening and planting proposals pertinent to landscape character will be impactful and will be part of the design process. Along the route, loss of hedgerow and tree planting has and will be avoided where practicable and is part of the design process. Any proposed mitigation will be part of a landscape and biodiversity strategy and ongoing commitment to maintenance in order to allow the replacement planting to successfully establish. The detailed landscape mitigation plans for the AGIs, and Pump Facility will be developed in coordination with Ecology and Biodiversity and reported in the ES.

Reinstatement and Long-Term Enhancement

- 12.6.18 Where the removal of existing hedgerows is necessary, the specification for the replanting works would ensure that species are appropriate and characteristic of that particular LCA. All reinstatement planting would be carefully designed to

ensure compatibility with adjacent vegetation, using native species which reflect the existing species present in the vegetation which would be lost.

- 12.6.19 All reinstatement planting would be carefully considered and details of the exact landscape reinstatement requirements assessed. This process would be carried out in liaison with the statutory consultees and would incorporate species that are appropriate to the local area. There would also be the opportunity to augment some of the existing landscape features through the Landscape and Ecology Management Plan (LEMP). This could, for example, include:
- The reinstatement of sections of hedgerow which are currently relatively species poor with a more varied species mix to increase species diversity.
 - Creation of species rich field margins, through seeding of species rich grassland.
 - Reinstatement of an existing field boundary through the filling of gaps with native hedgerow planting.
 - An increase in the number of hedgerow trees, through inclusion of native species within the planting mix.
- 12.6.20 Where it is necessary to remove mature trees within the draft Order Limits to facilitate the development, they would be replaced. Replacement trees would be planted using trees of local provenance where appropriate. Where smaller trees (saplings) are removed, they would also be replaced on an agreed replacement ratio basis.
- 12.6.21 Sections of other boundary features removed during construction, such as fences, would be replaced to match the original and / or adjacent boundary features. Boundary marker posts, test posts and aerial marker posts would be located at some boundaries to aid aerial surveillance and ground-based monitoring, and also to alert people to the presence of the pipelines to reduce any risk of damage to it. The location and design of these markers would be selected to minimise intrusion on the landscape.
- 12.6.22 Affected road verges throughout the draft Order Limits would be reinstated and, where appropriate, enhanced through the addition of species rich grass mixes.
- 12.6.23 Land disturbed to enable temporary drainage works would be reinstated and returned to existing land uses following the completion of construction. No specific landscape mitigation measures are proposed as no significant landscape impacts have been identified

- 12.6.24 Chapter 5: Agriculture and Soils, Chapter 7: Ecology and Biodiversity and Chapter 11: Cultural Heritage identify mitigation measures for the reinstatement works with respect to agricultural, ecological and cultural heritage requirements, and these measures would equally apply to the successful reinstatement of the visual and physical integrity of the landscape and the reduction of landscape impacts.

Table 12-14 – Embedded Landscape and Visual mitigation

Ref	Measure	Project phase	Responsible party
LV1	Siting and Layout: AGIs and Pump Facility are positioned to respond to the surrounding landscape character and to better integrate with their setting.	Design	Designer
LV2	Materials and colours: Finishes will be specified to reduce visual contrast and help the AGIs and Pump Facility sit more comfortably within their landscape setting.	Design	Designer
LV3	Any proposed earthworks will be shaped to ensure they are well integrated with the surrounding landscape and avoid an overly engineered appearance.	Design	Designer
LV4	The AGIs have been designed with a surrounding buffer area that will be used for soft landscape planting. This is likely to include native tree and shrub species, which will help to visually soften the appearance of the industrial structures and assist in integrating the AGIs into the surrounding landscape.	Design	Designer
LV5	Reinstatement of any hedgerows removed to facilitate construction of the pipeline.	Construction	Main Works Contractor

12.7 Preliminary Assessment of Potential Impacts

- 12.7.1 This Section details the preliminary assessment of potential impacts for the Project during construction, operation and decommissioning phases.

- 12.7.2 The construction of the pipelines has a limit of deviation applied, to allow flexibility of design. For the purposes of the PEIR, the limit of deviation is assumed to enable movement of the pipelines, anywhere within the draft Order Limits, which ensures that a precautionary approach to assessment has been taken.

Project Components

- 12.7.3 The following main components of the Project have been considered in relation to potential Landscape and Visual amenity impacts (full Project details provided in Chapter 2: Project Description):

Pipelines

- 12.7.4 The draft Order Limits defines the area within which the Pipelines could be laid and the majority of construction activity would occur.
- 12.7.5 Whilst the majority of Landscape and Visual disturbance associated with the draft Order Limits would be associated with the construction phase of the Project the potential impacts are likely to be limited in magnitude, due to their temporary nature and short duration. The exception to this is where the Project has potential for longer term residual impacts on landscape character, which may be apparent during the operational phase of the project, such as any loss of trees or other boundary features.
- 12.7.6 Due to the nature of a development of this type, the potential Landscape and Visual impacts along the route would be broadly the same across the three sections. A description of impacts common to all sections is provided within construction and operation stages below.

Above Ground Installations

- 12.7.7 The Landscape and Visual disturbance associated with the AGIs would be associated with both the construction and operational phases of the Project as well as the decommissioning stage (assumed 25 years after completion).

Construction Impacts

Landscape Character

Pipeline Sections

- 12.7.8 During construction of the Pipelines and AGIs, the introduction of construction activity into the landscape of the Study Area would potentially have some

temporary adverse impact on the character of the landscape. This is due to the adverse impact that the introduction of construction activity would have on the sense of tranquillity and remoteness, particularly where larger scale operations of longer duration would occur, such as at major river crossings or the landfall, and within the more tranquil landscape areas away from major settlements. However, the magnitude of the impact in all areas would be limited by the temporary nature and short duration of the change and also by the limited prominence of the works. As a result, overall, it is considered that the construction works would have no significant residual adverse impacts on landscape character.

12.7.9 The pipelines could give rise to the following potential impacts on landscape character:

- Temporary adverse impacts due to the introduction of construction activity to the rural landscape, in terms of the prevailing land use, sense of scale and remoteness, and overall character, particularly where larger scale and / or longer duration activities such as Horizontal Directional Drilling (HDD) are required.
- Direct impacts on landscape pattern through the temporary or permanent loss or fragmentation of important landscape components such as field boundaries, hedgerows, mature trees and landform, which could lead to residual adverse impacts.
- Direct impacts on the historic or cultural landscape through loss of important features, such as traditional field patterns or the drainage network, and the introduction of the Project into the wider landscape setting of a historic landscape, such as that at Brocklesby Park Registered Park and Garden.
- Direct impacts on the coastal and intertidal landscape through installation of the Pipelines at the landfall.

12.7.10 The majority of potential landscape impacts have been avoided through carefully considered routeing of the draft Order Limits. The impacts on landscape character within the draft Order Limits therefore mostly relate to the more short-term impacts caused by the removal of existing hedgerow field boundaries (including hedgerow trees in some locations) and the temporary loss of agricultural land along the length of the Project. This fragmentation of the existing landscape pattern would, in the main, have a short term, adverse impact on each of the LCAs through which the draft Order Limits passes, until reinstated land is returned to existing agricultural use (immediately following construction), grass verges are reinstated (approximately 6-12 months) and hedgerows become established (approximately 10-15 years in the majority of

cases). Where non-mature hedgerow trees would be removed, there would be a longer-term impact as it would take a minimum of 10-15 years for replacement planting to establish. Where mature trees would be removed, it would not be possible to fully mitigate for their loss within the timescales used in this assessment (15 years post completion), though replacement planting of larger plant stock would help to compensate for the loss to some degree.

- 12.7.11 The temporary loss of sections of hedgerow and hedgerow trees would adversely affect LLCAs to differing degrees depending upon the value of existing hedgerows removed, the completeness of the existing field patterns in the landscapes affected, and the importance of field pattern in defining the character of a particular landscape. However, these impacts are unlikely to be significant as although there would be a number of hedgerows affected along the length of the draft Order Limits, which in combination would have a physical impact over a long distance, the impact on the perception of landscape character in any single location would be limited to a very localised area, due to the small scale of the perceived change. As such, the impact on landscape character would be limited to impacts at a local level, and the change to the character of the wider landscape setting would not be significant.
- 12.7.12 Once replacement tree and grassland planting is complete, and hedgerows are re-established, the field pattern of the Study Area would be reinstated, and, in many places, provide some level of landscape enhancement where existing poor quality, gappy, or remnant hedgerows would be replaced by species rich hedgerows, with species rich margins wherever possible / appropriate. The exceptions to this would be where mature or historic hedgerows are removed, and / or where mature hedgerow trees would also be removed, as replacement, or compensatory planting and reinstatement would take longer to restore the features to replicate existing conditions.
- 12.7.13 The installation of marker posts along the pipeline route would have a permanent impact on local landscape character by the end of the construction phase.
- 12.7.14 The extent of the change to the NCAs, LLCAs and LLCTs would be small and generally experienced within the site and immediate setting only. Changes relating to the pipeline construction / installation (including those arising from the temporary works compounds) would be mostly short-term and reversible.

- 12.7.15 In summary, the construction phase impacts on landscape character may specifically arise from:
- Short term nature of movement activity of equipment and traffic to, from and within the draft Order Limits.
 - Removal of vegetation and soil stripping as part of site clearance and preparation.
 - Tunnelling activities, excavations and temporary stockpiling and storage of excavated materials resulting in on site changes to landform.
 - Construction working areas, storage areas and temporary structures associated with construction.
 - Construction roads, fencing, temporary lighting and security features.
 - Construction activities within the inter-tidal zone.
 - Construction of the Project and associated access routes and infrastructure.

AGIs

- 12.7.16 Unlike the pipelines, the AGIs would form permanent new features in the landscape, with potential for significant residual impacts on landscape character. The potential impacts associated with each of the AGIs are broadly similar due to the nature of the proposals. However, as these are proposed to be sited near to built up areas, the potential impacts for the majority would be perceived in the context of a semirural / industrial landscape setting.
- 12.7.17 Potential landscape impacts that could occur as a result of the AGIs generally, or in combination, are outlined below. The following potential landscape impacts have been identified:
- Temporary adverse impacts due to the introduction of construction activity, including AGI specific construction compounds, within the rural landscape, which has a sense of remoteness.
 - Adverse impacts associated with any potential change in the perception of scale, or urbanisation of the rural landscape through introduction of semi-industrial installations, including associated infrastructure at each of the AGI sites.
 - Direct impact on landscape pattern through the temporary or permanent loss or fragmentation of important landscape components such as field pattern, mature trees and landform, which could lead to residual adverse impacts.
 - Direct impacts on physical and perceptual elements of landscape character through a change in existing land uses.

- Direct impacts on the historic or cultural landscape through the introduction of a semi-industrial installation in close proximity to features of importance to the historic / cultural landscape.
- Direct impacts on the coastal and intertidal landscape through installation of the AGI at the landfall.
- Long term beneficial impacts associated with potential landscape enhancements as part of the mitigation of the AGI sites, such as reinforcement / reinstatement of historic field boundary enclosures, or an increase in vegetation cover.

Visual Amenity

Pipeline Sections

- 12.7.18 By their nature, visual impacts experienced during construction would be temporary, and of limited duration. Although the construction site would be evident throughout the construction period, the actual construction activity would vary in its scale, intensity, location, and prominence as different stages of work take place along the length of the pipelines. However, the overall scale of construction activity would be relatively small and would not appear out of scale in the context of the wider landscape, particularly in mid to longer distance views from receptors outside of the immediate vicinity of the draft Order Limits. In all but close proximity, views from the immediate setting of the works, construction activity would not be prominent and would generally appear comparable in scale and intensity to agricultural activity, typical of the existing landscape setting.
- 12.7.19 Visual impacts associated with the construction works across the majority of the route would be seen from distance due to the generally flat and open nature of the landscape. For users of PRoW, these effects would be experienced as dynamic views, gradually changing as the receptor moves through the landscape. However, due to the transient nature of construction, the apparent geographic scale and duration of the works, visual impacts would be limited. The number of receptors located within the Study Area would be limited, due to the sparsely settled character of the agricultural landscape, and the considered routing of the draft Order Limits, away from settlements, which would further reduce the potential for wider scale impacts on visual amenity more generally.
- 12.7.20 In summary, although a limited number of receptors would experience some adverse visual impacts during construction, impacts would not be significant due primarily to the transient nature of construction works and short duration of impacts. Furthermore, although the construction works would be experienced

over a long, linear area, the contained corridor of land required to construct the Project and localised nature of impacts would further limit the magnitude of impacts upon the visual amenity of individual receptors. Due to the limited nature of individual impacts and the localised nature of impacts, there would be no significant aggregated impact on visual amenity more generally across the Study Area.

12.7.21 As the duration of impacts is considered a determining factor in terms of the significance of visual impacts, particularly during construction, indicative construction timescales for the pipelines and AGIs are set out in Chapter 2: Project Description.

12.7.22 Although not predicted to be significant, potential impacts on visual amenity, which could occur as a result of the construction of the pipelines, are identified for the benefit of completeness and information purposes. Potential receptors include day to day users of the Study Area, including local residents and recreational users of the landscape. Road users and people at their places of work have been scoped out of this PEIR.

12.7.23 The following potential visual impacts could occur as a result of the Pipeline construction:

- Temporary harm to visual amenity due to the introduction of construction activities, particularly in more rural locations or from locations with recognised or valued views of the landscape including the coastal landscape. Typical activities with the potential to affect visual amenity include:
 - Site clearance.
 - Introduction of temporary storage facilities, site compounds and temporary parking areas.
 - Temporary installation of large-scale construction equipment at tunnelling, boring, or drilling sites either side of major crossings.
 - Earth movement, temporary storage and modelling.
 - Vehicular and large plant movement on and off-site.
 - Night-time lighting (HDD locations) and working outside of normal working hours.
- Loss of visual amenity associated with the loss of existing landscape features, such as hedgerows and / or mature trees.

AGIs

- 12.7.24 Potential visual impacts that could occur as a result of construction of the AGIs, either individually or in combination, are outlined below:
- Temporary adverse impacts due to the introduction of construction activity within existing views of the rural landscape.
 - Adverse impacts due to a loss of visual amenity associated with the temporary or permanent loss of existing landscape features, which could lead to residual adverse impacts.
 - Adverse impacts due to visual intrusion and / or an urbanising influence of the rural landscape in views, experienced by day-to-day users of the Study Area, including local residents, recreational users, and road users, through the introduction of semi-industrial, permanent above ground features; and
 - Harm to beneficial impacts associated with potential landscape enhancements as part of the mitigation of the AGI sites, such as an increase in visual screening, and / or restoration of the landscape in views.
- 12.7.25 A summary of the potential impacts during the Construction phase is set out in the table below. Further detailed assessment of impacts will be provided in the ES.

Table 12-15 – Construction Phase – Preliminary assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Landscape Character	Low to Medium Generally rural and open landscape but with urban detractors	Temporary loss of agricultural land, hedgerows and trees.	Low to medium	Temporary	Adverse	Direct
Visual Amenity	Low to High depending on receptors	Temporary loss of agricultural land, hedgerows and trees.	Low to medium	Temporary	Adverse	Direct

Operation

Landscape Character

Pipeline Sections

- 12.7.26 Given that the pipeline aspect of the Project contains no permanent above ground elements. There are unlikely to be any significant impacts from the pipeline on landscape character, this has been scoped out of the operational phase of the PEIR.

AGIs

- 12.7.27 Operational and enduring impacts of the AGIs would be limited to short to medium term adverse landscape character impacts relating to the continued temporary loss of hedgerows and occasional mature trees within the working areas. However, once reinstatement planting is completed any impacts would reduce over time as the planting establishes and integrates with the existing surrounding landscape.
- 12.7.28 The majority of adverse impacts would be limited to the short term, as replacement planting would reinstate existing field boundaries and once established, provide some level of landscape enhancement due to the restoration of historic field boundaries, and the reinforcement of landscape pattern. There would be some medium to longer term adverse impacts associated with the loss of mature hedgerows and hedgerow trees, as it would take longer for replacement planting to compensate for their loss. However, due to the relatively small number of these features affected, the level of planting proposed, and the limited influence of the impact on the wider character, overall it is considered that there would not be a significant residual adverse impact.
- 12.7.29 Furthermore, it should be re-stated that the impacts to existing hedgerows and mature trees identified in this Section represent a worst case, and impacts, in reality, would be reduced further due to future opportunities to avoid direct impacts through micro-siting and realignment within the draft Order Limits during the detailed design and construction process.
- 12.7.30 The number of mature trees directly affected by the Project would be limited by careful micro-routeing of the Pipelines, which would aim to minimise the number of mature trees removed within the draft Order Limits. Although there are a small number of locations where the loss of mature trees would be unavoidable the number of trees affected overall would be limited. In addition, where trees

are removed, landscape mitigation would compensate for the loss, which would replace the amenity of existing trees removed in the medium to long term.

- 12.7.31 Although the removal of hedgerow sections and occasional mature trees would have some adverse, short-term impact prior to their reinstatement, it is considered that this change would not cause a significant impact to landscape character due to the generally open character of the landscape.
- 12.7.32 Post-construction and operational impacts on landscape character would be restricted to those arising from the differences between the appearance of existing and replanted sections of hedgerows. Such differences would be very limited in extent and would reduce over time as the replanted hedgerows grow and develop.
- 12.7.33 Once operational, the landscape features lost to the construction of the pipelines would have been replaced and reinstated. Although some of these replaced features such as hedgerows, may take ten to fifteen years to fully achieve their baseline state, their overall importance would be relatively minor in the context of the wider landscape character and views. As such it is anticipated that there would be no significant impacts either on character or on views during operation other than potentially to the areas affected by the AGIs. It is possible that the AGIs could potentially be discernible from views up to 1.5 km in distance from the Project, with the exception of the Pump Facility at Easington which is likely to be discernible up to 3.0 km.
- 12.7.34 Operational phase impacts may arise from:
- The proposed AGIs and associated infrastructure.
 - Lighting within and outside the AGI compounds, and within the vehicle circulation and parking areas.
 - Proposed access roads and other associated infrastructure within the AGIs site.
 - Movement of vehicles to, from and within the AGIs.
- 12.7.35 Further detailed assessment of impacts from AGIs is to be provided in the ES.

Visual Amenity

Pipeline Sections

- 12.7.36 Given that the pipeline aspect of the Project contains no permanent above ground elements. There are unlikely to be any significant impacts from the

pipeline on visual amenity, this has been scoped out of the operational phase of the PEIR.

AGIs

- 12.7.37 Operational and enduring impacts of the AGIs would be limited to short to medium term adverse visual impacts relating to the continued temporary loss of hedgerows and occasional mature trees within the AGI working area. However, for the majority of visual receptors, the temporary loss of existing vegetation within the AGI working area would not cause a change of sufficient magnitude to significantly affect visual amenity during this period, particularly once reinstatement planting is completed. In the case of the relatively few locations where elevated and / or longer distance views are available within the Study Area, the temporary loss of hedgerow sections would form a relatively small feature of the view and would be seen within the context of a much wider views of the landscape, which would limit the magnitude of the adverse impact.
- 12.7.38 In terms of understanding and assessing dynamic movements in the landscape and how heritage assets and landscape features are viewed from more than one point in the landscape, these have been considered within the assessment as part of the viewpoint selection process. This is particularly relevant to movements along waterways and public footpaths, and this has been taken into account within the assessment.

Summary of Visual Impacts

Section 1 – Drax area to the River Trent

- 12.7.39 There are 4 AGIs in Section 1. The Project would slightly add to the urbanising influence that Drax Power Station has upon the visual amenity in this section. However, due to the small scale of the AGI options, the magnitude of the impact would be limited and highly localised. Proposed mitigation measures include structural planting such as native woodland and shrub planting around all sides of AGI. This would help to integrate the AGI and would have some beneficial impact on visual amenity in the longer term through additional woodland cover.
- 12.7.40 The Project would have no significant impact on this section of the visual Study Area, due to the small scale of the installation, and the influence of existing infrastructure on existing views.

Section 2 – North Lincolnshire

- 12.7.41 There are 5 number of AGIs in Section 2. The Project would slightly add to the urbanising influence that the oil refineries at North Killingholme have upon the visual amenity in this section. However, due to the small scale of the AGI options the magnitude of the impact would be limited and highly localised. Proposed mitigation measures include structural planting such as native woodland and shrub planting around all sides of AGI. This would help to integrate the AGI and would have some beneficial impact on visual amenity in the longer term through additional woodland cover.
- 12.7.42 The Project would have no significant impact on this section of the visual Study Area, due to the small scale of the installation, and the influence of existing infrastructure on existing views.

Section 3 – East Riding of Yorkshire

- 12.7.43 There are 3 AGIs in Section 3. The Easington Pump Facility would form an addition to a largely rural and open landscape. However, with the context of the large Natural Gas Terminal which already exists at Easington, and numerous wind turbines within the local landscape, the magnitude of the impact would be reduced. Proposed mitigation measures include structural planting such as native woodland and shrub planting, which would help visually integrate the AGI into its surroundings, and would have some beneficial impact on character in the longer term, through additional woodland cover.
- 12.7.44 Elsewhere, the visual impact of AGIs in this section is not expected to be significant due to the small scale of the infrastructure.

Pump Facility (Section 3 – East Riding of Yorkshire)

- 12.7.45 The visual impact of the Easington Pump Facility would be seen from a fairly wide area given the proposed maximum heights of the structures. However, the magnitude of this impact would be somewhat reduced by the proximity of the site to the existing Natural Gas Terminal at Easington and the presence existing infrastructure which already influences visual amenity. The number of residential receptors within the visual envelope is relatively low, though there are some views available to local road users (cyclists). In addition, there are several stretches of PRow within the study area, including one PRow which passes directly through the proposed Pump Station location, where effects are likely to be more pronounced.

- 12.7.46 A summary of the potential impacts during the Operation phase is set out in the table below. Further detailed assessment of impacts will be provided in the ES.

Table 12-16 – Operation Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Landscape Character	Low to Medium Generally rural and open landscape but with urban detractors	AGIs potentially adding to the urbanised influence of other existing industrial infrastructure within an otherwise generally semi-rural landscape character.	Low to medium	Temporary	Adverse	Direct
Visual Amenity	Low to High depending on receptors	Visual impacts from the introduction of industrial infrastructure into predominantly semi-rural views.	Low to medium	Temporary	Adverse	Direct

Decommissioning

- 12.7.47 Specific proposals for the decommissioning of the Project would be devised at an appropriate time in the future and following decommissioning the Pipelines would be retained in situ; all infrastructure associated with the AGIs would be removed and the land would be restored (other than land used for planting and landscape mitigation / enhancement). There would be only limited potential for adverse impacts during the decommissioning works, which would be unlikely to be significant due to the temporary nature and short duration of impacts. Impacts will generally be similar to those during the construction phase. Furthermore, it would be very unlikely for there to be any significant residual impacts on landscape character or visual amenity as baseline conditions would be restored to a landscape similar to the existing situation.
- 12.7.48 At the end of the decommissioning phase, the landscape would return to the baseline condition, due to the removal of above ground infrastructure from the landscape. There may be some landscape components such as hedgerows and trees which are retained beyond the decommissioning phase depending on their contribution to BNG. This will be further developed and reported in the ES.
- 12.7.49 A summary of the potential impacts during the Decommissioning phase is set out in the table below. Further detailed assessment of impacts will be provided in the ES.

Table 12-17 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Landscape Character	Low to Medium Generally rural and open landscape but with urban detractors	Urbanising influence of AGIs removed. Semi-rural baseline restored. Temporary effects during decommissioning activity.	Low	Temporary	Adverse	Direct
Visual Amenity	Low to High depending on receptors	Landscape reverts to baseline with removal of industrial influence within semi-rural views. Temporary effects during decommissioning activity.	Low	Temporary	Adverse	Direct

12.8 Additional Mitigation and Enhancement Measures

- 12.8.1 Any secondary mitigation required would be developed and reported in the ES and would be developed in collaboration with biodiversity measures to, so far as practicable, adopt a sustainable approach to ensure enhancement that leaves the environment in a better condition than it was before development.

Construction

- 12.8.2 No specific secondary Landscape and Visual mitigation measures are currently proposed to mitigate potential impacts.

Operation

- 12.8.3 Opportunities for further Landscape and Visual enhancement around the AGIs and Pump Facility would be explored in conjunction with the stakeholders and reported in the ES.

Decommissioning

- 12.8.4 Landscaping and reinstatement following decommissioning provides an opportunity to provide further environmental enhancement. This will be developed in detail and reported in the ES.

12.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 12.9.1 Table 12-18 below summarises the preliminary assessment of potential significant effects associated with the Project.

Table 012-18 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Mitigation Measures	Potential significant effects
Landscape Character	Low to Medium. Generally rural and open landscape but with urban detractors.	Construction	Temporary loss of agricultural land, hedgerows and trees.	Good practice measures as set out in the CEMP.	Not significant
Visual Amenity	Low to High depending on receptors.	Construction	Temporary loss of agricultural land, hedgerows and trees.	Good practice measures as set out in the CEMP.	Not significant
Landscape Character	Low to Medium. Generally rural and open landscape but with urban detractors.	Operation	AGIs potentially adding to the urbanised influence of other existing industrial infrastructure within an otherwise generally semi-rural landscape character.	Replacement hedgerow and tree planting, subject to landowner agreements. Requirement for any secondary mitigation to be confirmed in the ES.	Not significant
Visual Amenity	Low to High depending on receptors.	Operation	Visual impacts from AGIs on receptors.	Replacement hedgerow and tree planting, subject to landowner agreements. Requirement for any secondary mitigation to be confirmed in the ES.	Not significant

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Mitigation Measures	Potential significant effects
Landscape Character	Low to Medium. Generally rural and open landscape but with urban detractors.	Decommissioning	Landscape restored to original condition. No landscape impacts predicted.	Replacement agricultural grass, hedgerow and tree planting subject to landowner agreements. Requirement for any secondary mitigation to be confirmed in the ES.	Not significant
Visual Amenity	Low to High depending on receptors.	Decommissioning	Landscape restored to original condition. No visual impacts predicted.	Replacement agricultural grass, hedgerow and tree planting subject to landowner agreements. Requirement for any secondary mitigation to be confirmed in the ES.	Not significant

12.10 Next Steps

- 12.10.1 A full LVIA will be reported in the ES which will further develop the understanding of significance of impacts, in line with the technical methodology note shared with consultees in the Scoping Report.
- 12.10.2 Any gaps in information identified in this PEIR will be considered and addressed along with specific mitigation measures as part of the assessments reported in the ES.
- 12.10.3 The proposed Landscape and Visual assessment will be further developed and refined based on any relevant responses to Statutory Consultation and / or engagement.
- 12.10.4 In the ES, the detailed assessment will include further:
- Detail on the refined AGIs and their position and scale.
 - Review of viewpoints and the ZTV model.
 - Detailed assessment on the impacts of the AGIs and associated mitigation.

12.11 References

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- Ref 12.4 National Planning Policy Framework (2012). Available at <https://www.gov.uk/guidance/national-planning-policy-framework/12-achieving-well-designed-places> (Accessed: September 24, 2025)

- Ref 12.5 North Yorkshire Council (2024), *Selby Local Plan Revised Publication*, Available at <https://edemocracy.northyorks.gov.uk/documents/s28009/Appendix%201%20Revised%20Publication%20Local%20Plan%20Consultation%20Document.pdf> (Accessed: August 20, 2025)
- Ref 12.6 Selby District Council (2024), Draft *Selby District Core Strategy Local Plan*. Available at <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN010120-000979-Selby%20District%20Core%20Strategy%20Local%20Plan,%202013-14562-1.pdf> (Accessed: August 20, 2025)
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- Ref 12.9 Nationally Significant Infrastructure Projects: Advice on Good Design (2024), Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design#:~:text=to%20its%20surroundings.%E2%80%9D,Achieving%20good%20design,good%20process%20and%20good%20outcomes> (Accessed: September 24, 2025)
- Ref 12.10 Landscape Institute (LI) and the Institute of Environmental Management and Assessment (IEMA) (2013), *The Guidelines for Landscape and Visual Assessment (GLVIA)*, 3rd Edition.
- Ref 12.11 Landscape Institute (2024), Technical Guidance LITGN-2024-01- Notes and Clarifications on Aspects of Guidelines for Landscape and Visual Impact Assessment Third edition (GLVIA3), Available at: https://www.landscapeinstitute.org/wp-content/uploads/2024/08/LITGN-2024-01-GLVIA3-NC_Aug-2024.pdf (Accessed August 20 2025).
- Ref 12.12 Christine Tudor, 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 (Accessed August 20 2025)

- Ref 12.13 Landscape Institute (2019) *Technical Guidance Note 06/19: Visual Representation of Development Proposals*. Available at https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf (Accessed: August 20 2025)
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- Ref 12.20 Natural England (2012), *Seascape Characterisation around the English Coast (Marine Plan Areas 3 and 4 and Part of Area 6 Pilot Study)*, Available at: <https://publications.naturalengland.org.uk/file/2945179> <https://publications.naturalengland.org.uk/publication/2736726?category=10006> (Accessed August 20, 2025).
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13 Noise and Vibration

13.1 Introduction

- 13.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of noise and vibration. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Volume 2 - Chapter 2: Project Description.
- 13.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Noise and Vibration effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 13.1.3 This chapter should be read in conjunction with:
- Chapter 7: Ecology and Biodiversity, for the assessment of sensitive ecological receptors.
 - Chapter 11: Cultural Heritage, for interactions between Noise and Vibration and Cultural Heritage assets.
 - Chapter 14: Socio-economics, Recreation and Tourism, for the potential noise and vibration effects that can impact socio-economic, recreational and tourism receptors.
 - Chapter 15: Human Health and Wellbeing, for the assessment of noise and vibration on human mental and physical health, and
 - Chapter 16: Traffic and Transport, for the identification of construction traffic routes and sources of noise and vibration.
- 13.1.4 This chapter is supported by the following figure:
- Volume 3 - Figure 13.1: Noise Assessment Study Area.
- 13.1.5 This chapter is supported by the following appendices:
- Volume 4 - Appendix 13.1: Baseline Noise Survey.
 - Volume 4 - Appendix 13.2: Construction Phase Significance Criteria, and
 - Volume 4 - Appendix 13.3: Construction Phase Plant Lists.

13.2 Legislation, Policy and Guidance

Legislation

13.2.1 Legislation relevant to Noise and Vibration is detailed in Table 13-1.

Table 13-1 – Summary of Legislation relevant to Noise and Vibration

Legislation	How it is considered within this PEIR
The Control of Pollution Act 1974 (Ref.13.1)	Best Practicable Means (BPM) is defined within the Control of Pollution Act which would be implemented as an embedded mitigation measure for the construction and decommissioning phase activities. Due regard is also given to Sections 60 and 61 of the Control of Pollution Act which give the local authority powers to control noise arising from construction and demolition works, regardless of whether a statutory nuisance has been caused or is likely to be caused. These powers may be exercised either before works start or after they have commenced.
The Environmental Protection Act 1990 (Ref.13.2)	Due regard is given to The Environmental Protection Act as it provides a local authority with powers to serve a noise abatement notice in the event that they consider that unnecessary and objectionable noise is being created. The abatement notice may require that the noise be stopped altogether or limited to certain times and level to avoid causing a nuisance in the future.

Policy

National Planning Policy

- 13.2.2 National Planning Policy relevant to Noise and Vibration is detailed in Table 13-2

Table 13-2 – Summary of National Planning Policy relevant to Noise and Vibration

Planning Policy Reference	Policy Context	How it is considered within this Preliminary Environmental Information Report (PEIR)
EN-1 (Ref.13.3)		
Section 5.12	Section 5.12 of EN-1 describes generic impacts relating to noise and vibration. It also defines the elements that should be included in the applicant's noise and vibration assessment where impacts are likely to arise, as defined below: • A description of the noise and vibration generating aspects of the development. • Identification of noise sensitive receptors and noise sensitive areas that may be affected. • The characteristics of the existing noise environment. • A prediction of how the noise environment will change with the proposed development. • An assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors. • If likely to cause disturbance, an assessment of the effect of underwater or subterranean noise, and • Measures to be employed in mitigating the effects of noise. It stipulates the requirements for a project to demonstrate good acoustic design. It also provides guidance on the Secretary of State decision making process.	The Noise and Vibration assessment follows the procedures outlined in EN-1.
EN-4 (Ref.13.4)		
Section 2	Section 2 of EN-4 provides the primary basis for decisions by the Secretary of State on applications it receives for gas supply infrastructure and gas and oil pipelines. The document provides a high-level overview of key considerations and what needs to form part of an applicant's noise and vibration assessment for proposed schemes. It splits out different components, including gas reception facilities and gas/oil pipelines. EN-4 references the guidance provided in Section 5.12 of EN-1 (Ref 13.3) in terms of generic noise and vibration considerations, the items to be included within the applicant's assessment, and the Secretary of State's decision-making process.	The Noise and Vibration assessment follows the procedures outlined in EN-4.
National Planning Policy Framework (NPPF) (Ref.13.5)		
Section 15	The NPPF is the means by which noise is considered within the planning regime. The NPPF does not contain assessment design target, instead providing a series of policies, giving local authorities the flexibility in meeting the needs of local communities. The NPPF states: "Planning policies and decisions should contribute to and enhance the natural and local environment by [...] preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans." "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life."	The Noise and Vibration assessment has been undertaken in line with the NPPF requirements, where appropriate.

Planning Policy Reference	Policy Context	How it is considered within this Preliminary Environmental Information Report (PEIR)
Noise Policy Statement for England (NPSE) (Ref.13.6)		
All	The Department for Environment, Food & Rural Affairs (Defra) sets out the approach to noise within the Government’s sustainable development strategy. The significance of impacts from noise are defined within the NPSE as follows: “There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are: NOEL – (No Observed Effect Level) - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. LOAEL (Lowest Observed Adverse Effect Level) - This is the level above which adverse effects on health and quality of life can be detected. Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level. SOAEL – (Significant Observed Adverse Effect Level) - This is the level above which significant adverse effects on health and quality of life occur.” The three aims of the NPSE are to: “Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”	The noise and vibration assessment has followed the approach outlined within the NPSE.

Local Planning Policy

- 13.2.3 Local Planning Policies relevant to Noise and Vibration are detailed in Table 13-3.

Table 13-3 – Summary of Local Planning Policy relevant to Noise and Vibration

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
East Riding Local Plan Update 2020-2039 (Adopted April 2025), (Ref.13.7)	Policy EC5: Supporting the Renewable and Low Carbon Energy Sector	Proposals for the development of the energy sector will be supported where any significant adverse impacts are addressed satisfactorily, and the residual harm is outweighed by the wider benefits of the proposal. Development should also be acceptable in terms of: The effects of development on local amenity, including noise, air and water quality, traffic, vibration, dust, light (including reflection, glint, glare and shadow flicker), and visual impact.	This assessment considers noise and vibration impacts associated with the Project, and measures to mitigate any significant adverse impacts.
	Policy ENV6: Managing environmental hazards	Environmental hazards, such as flood risk, coastal change, groundwater pollution and other forms of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment.	This assessment considers noise and vibration impacts associated with the Project, and measures to mitigate any impacts will be proposed, where required.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby District Council Local Plan, 2024 (Ref.13.8)	Policy SG10: Low Carbon and Renewable Energy (Strategic Policy)	A. Proposals for low-carbon and renewable-energy storage and generation (including hydrogen transportation networks) will be supported where: 1. Planning impacts of the development and associated infrastructure, both individually and cumulatively, are, or can be made, acceptable; 2. Appropriate weight, consideration and mitigation has been given to the following where applicable:... vi. Living conditions and amenity including due to noise, odour, dust, vibration, visual intrusion, shadowing or flicker.	This assessment considers noise and vibration impacts associated with the Project, and measures to mitigate any impacts will be proposed, where required.
Selby District Council Local Plan, 2024 (Ref.13.8)	Policy NE8 - Pollution and Contaminated Land	A. Development which could present noise pollution, light pollution, groundwater pollution, contamination of land or water and other environmental pollution or unstable land will not be permitted unless satisfactory remedial or preventative measures are incorporated. This will be considered an integral element of the scheme. Measures should be carried out before the use of the site commences and	This assessment considers noise and vibration impacts associated with the Project, and measures to mitigate any impacts will be proposed, where required.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		sufficient consideration provided to both human and environmental receptors of any potential impact. Planning applications must be accompanied by the appropriate assessments in line with the Council's Validation Checklist.	
North East Lincolnshire Local Plan 2013 to 2032 (Ref.13.9)	Policy 31: Renewable and low carbon infrastructure	Proposals for renewable and low carbon energy generating systems will be supported where any significant adverse impacts are satisfactorily minimised and the residual harm is outweighed by the public benefits of the proposal. Developments and their associated infrastructure will be assessed on their merits and subject to the following impact considerations, taking account of individual and cumulative effects: B. local amenity, including noise, air quality, traffic, vibration, dust and visual impact.	This assessment will consider noise and vibration impacts associated with the Project, and measures to mitigate any impacts will be proposed, where required.

Guidance

13.2.4 The Noise and Vibration assessment has been carried out in accordance with the following guidance:

- BS 4142:2014+A1:2019 - Methods for Rating and Assessing Industrial and Commercial Sound (Ref.13.10).
- BS 5228-1:2009+A1:2014 - Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise (Ref.13.11).
- BS 5228-2:2009+A1:2014 - Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration (Ref.13.12).
- BS 7445-1:2003 - Guide to Quantities and Procedures (Ref.13.13).
- BS EN 60942:2018 - Electroacoustics – Sound Calibrators (Ref. 13.14).
- BS EN 61672-1:2013 - Electroacoustics – Sound Level Meters (Ref. 13.15).
- BS ISO 9613-2:2024 – Acoustics. Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure level outdoors (Ref. 13.16).
- Calculation of Road Traffic Noise Memorandum, 1988 (Ref. 13.17).
- Canal & River Trust, Code of Practice for Works Affecting the Canal & River Trust (2022) (Ref. 13.18).
- Design Manual for Roads and Bridges, LA 111 Noise and Vibration (2020) (Ref. 13.19).
- Institute of Environmental Management & Assessment (IEMA), Guidelines for Environmental Impact Assessment (Ref. 13.20).
- IGEM/TD/1 Edition 6 - Steel Pipelines for High Pressure Gas Transmission (2024) (Ref. 13.21).
- Planning Practice Guidance – Noise (2019) (Ref. 13.22).
- PD 8010-1:2015+A1:2016 Pipeline Systems – Part 1: Steel Pipelines on Land – Code of Practice (Ref. 13.23).
- World Health Organisation, Guidelines for Community Noise (Ref. 13.24).
- World Health Organisation, Night Noise Guidelines for Europe (Ref. 13.25).

13.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

13.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined in Table 13-4 below.

Table 13-4 – Summary of Scoping Opinion relevant to Noise and Vibration

Section Reference	Matter	Comments	Response
ID 3.8.1	Noise and vibration from Pipeline Inspection Gauge (PIG) trap and block valve Above Ground Installations (AGIs) – operational phase	The Scoping Report states that there would be no routine noise or vibration-generating processes or equipment at the AGIs. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the Environmental Statement (ES).	Agreement noted. This matter is not assessed further within the PEIR or ES.
ID 3.8.2	Noise from traffic (excluding Pump Facility) – operational phase	The Scoping Report states that the AGIs would not be permanently manned during the operational phase. The Inspectorate agrees that operational phase traffic flows are therefore unlikely to give rise to significant adverse noise effects and that this matter can be scoped out of the ES. However, the ES should clearly set out the likely number and type of operation and maintenance vehicle movements associated with the project (excluding the Pump Facility) to evidence that operational and maintenance traffic would be below relevant assessment thresholds.	Agreement noted. This matter is not assessed further within the PEIR and will not form part of the ES. Appropriate justification to be contained in the ES.
ID 3.8.3	Noise from buried pipelines – operational phase	The Inspectorate agrees that significant noise effects from buried pipelines are unlikely and that this matter can be scoped out of the ES.	Agreement noted. This matter is not assessed further within the PEIR or ES.
ID 3.8.4	Vibration from AGIs - operational phase	The Scoping Report states that significant ground borne vibration resulting from the operation of the AGIs is not anticipated due to use of appropriate vibration isolation. Subject to clear evidence within the ES and associated Development Consent Order (DCO) application documents that vibration isolation measures are incorporated within the proposed development, the Inspectorate agrees that an assessment of effects can be scoped out of the ES.	Agreement noted. This matter is not assessed further within the PEIR and will not form part of the ES. Appropriate justification to be contained in the ES Project Description.
ID 3.8.5	Noise from buried pipelines - decommissioning phase	On the basis that the pipelines would remain buried, the Inspectorate agrees that no noise would be generated by this project element during decommissioning. As such, this matter can be scoped out of the ES.	Agreement noted. This matter is not assessed further within the PEIR or ES.
Canal and River Trust Response	Canal & River Trust assets	We wish to highlight that works to install pipelines below our waterways, as suggested in the scoping document, would need to be carefully managed to avoid any significant vibration or loading that could adversely impact the stability of the canal or riverbanks above.	Canal & River Trust assets will be considered as part of the ES.
Canal and River Trust Response	Canal & River Trust assets	We request that methodology and associated risk mitigation details should be submitted prior to the commencement of development on site. We advise that this information should be incorporated into the EIA. In chapter 12, the existing scoping report highlights that Noise and Vibration assessments will focus upon impacts to sensitive	Canal & River Trust assets will be considered as part of the ES.

Section Reference	Matter	Comments	Response
		receptors, such as residential property. We request that this should be expanded so that any risk to the banks of the Ouse and Aire & Calder Navigation, including existing stone and piled wash walls, are fully assessed.	
East Riding of Yorkshire Council response	Scope of assessment	The Environmental Control Officer has reviewed the Humber Carbon Capture Pipeline Environmental Impact Assessment (EIA) Scoping Report Volume 1 (dated January 2025, report ref: 10607856-ARC-XX-XX-XX-ZZ-0002-A1-Scoping Report_V1), specifically Chapter 12 – Noise and Vibration and is satisfied with the proposed scope regarding noise and vibration during the different phases of the proposed development.	Agreement noted.
Hull City Council	Study Area of assessment	Given that part of the proposed cable route would be located in close proximity to the administrative area of Hull City Council, and that both strategic and local road networks in the city could be affected by increased vehicular traffic / HGV movements during the construction period, there is potential scope for noise and vibration impacts to register with sensitive receptors within the city, and it would therefore be appropriate for Hull City Council to be consulted in addition to the organisations listed.	To be included as part of the ES if the construction traffic flows are considered to have the potential to give rise to significant impacts.
North Lincolnshire Council	Consultation	Consultation with the local authority regarding specific points in the noise assessment have been mentioned Chapter 12. This department would welcome further consultation with regard to the location of identified noise sensitive receptors during the construction and operational stages of the project.	Further consultation will be undertaken as appropriate during the ES stage.
North Yorkshire Council	Surveys	Although types of receptors have been identified, there are currently no proposed noise monitoring locations. Having these agreed, prior to the noise assessments, with the relevant stakeholders would provide reassurance that any mitigation required for any issues which may arise by noise and vibration impacts from construction and the operational noise impacts from the proposed development will be considered and proposed as accurately as possible. Given that the relevant guidance and British Standards documents are being used to assess noise and vibration control on construction sites (BS 5228:2009+A1:2014) for the construction period as well as for rating and assessing industrial and commercial sound (BS 4142:2014+A1:2019) for the operational aspect of the site this further leads into the reassurance above.	To inform the operational phase assessment, a baseline noise survey has been undertaken for the Pump Facility only. This reflects the lack of routine noise or vibration-generating processes or equipment at the PIG trap and block valve AGIs. It is intended that construction activities will be assessed against the lower bound cut-off value in Annex E of BS 5228-1:2009+A1:2014 (Ref 13.11) and therefore would not require baseline measurement data to be collected along the length of the pipeline route corridor to derive the criteria.

Section Reference	Matter	Comments	Response
Appendix 2	Response from North Yorkshire Council	Assessment of Tranquillity – There is potential for adverse noise effects associated with construction and operational noise arising from static plant and AGI installations. Consideration should be given to assessment of tranquillity and effect on local character and setting, particularly in relation heritage and other local sensitive receptors such as residential properties. PROW, local farmsteads. We would wish to agree a methodology and approach for this.	Operational phase noise levels will be generated by the Easington Pump Facility only. There would be no routine noise or vibration-generating processes or equipment at the other AGIs. Given the long-term nature of emissions generated by the Pump Facility, consideration will be given to a range of local sensitive receptors as part of the ES. Consideration of construction induced noise levels experienced by users of the PROW will be included as part of the ES.

Summary of Engagement

- 13.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 13-5 below.

Table 13-5 – Summary of Stakeholder Engagement relevant to Noise and Vibration

Consultee	Date and method of engagement	Summary of Issues Raised	Response
East Riding of Yorkshire Council - Public Protection Team	16 January 2025, 29 January 2025 Email	Clarification sought on the validity of noise survey data collected in 2022, at sensitive receptors surrounding the proposed Pump Facility site.	East Riding of Yorkshire Council considered the baseline noise survey report from 2022 and agree that the survey data remains valid.

13.4 Assessment Methodology

Baseline Data

Study Area

- 13.4.1 The Study Area for the construction phase assessment will consider Noise and Vibration sensitive receptors that are located within 300 m of the draft Order Limits. This has been determined based on the guidance set out in BS 5228-1:2009+A1:2014 (Ref 13.11), BS 5228-2:2009+A1:2014 (Ref 13.12) and other related guidance documents, including Design Manual for Roads and Bridges (DMRB) document ref. 'LA 111 - Noise and Vibration' (Ref 13.19).
- 13.4.2 For certain construction activities such as trenchless crossings, there is a potential requirement for works to be undertaken on a 24-hour basis. To account for the more stringent threshold criteria during the night as derived from BS 5228-1:2009+A1:2014 (Ref 13.11), the Study Area for the night-time construction phase assessment will be extended to consider sensitive receptors that are located within 600 m of the night-time works. At distances in excess of 600 m, the construction noise levels would typically be below the lowest threshold levels for the night-time period as derived from BS 5228-1:2009+A1:2014 (Ref 13.11).
- 13.4.3 For the assessment of operational phase noise levels, the Study Area will extend out to the nearest or most exposed noise sensitive receptors surrounding the Pump Facility at Easington. These include residential properties on Balk Hill, Easington Road and Old Newton Road. Operational noise at the AGIs has been scoped out in line with the Scoping Opinion.
- 13.4.4 The Study Area for the decommissioning phase assessment will consider noise and vibration sensitive receptors that are located within 300 m of the proposed AGIs and Pump Facility. This is on the basis that the buried pipeline would remain in situ and works would not need to be undertaken beyond the core daytime working hours.

Baseline Data Collection

Desk Study Sources

- 13.4.5 Baseline conditions of the Project were established during a desk study using the following sources:
- Aerial photography and mapping, including AddressBase data.

- Department for Environment, Food and Rural Affairs (Defra) Round 4 strategic noise mapping (Ref 13.26), and
- A baseline noise survey in the vicinity of the proposed Pump Facility.

Site Visits and Surveys

13.4.6 A baseline noise survey was undertaken in June 2022 to establish the prevailing acoustic environment at noise sensitive receptors situated in the vicinity of the proposed Pump Facility associated with the Project. The noise survey for the Pump Facility was heavily influenced by natural sounds and is therefore unlikely to have changed significantly, as there has been no significant developments within the intervening period that could serve to alter the acoustic environment. On the basis that the 2022 survey locations adequately represent the noise sensitive receptors surrounding the proposed Pump Facility, it is considered that the existing noise survey data can be used to inform the assessment. This was agreed with the East Riding of Yorkshire Council Public Protection Team.

13.4.7 The baseline survey comprised unattended noise monitoring at five locations, which accounted for the surrounding noise sensitive receptors in the vicinity of the Pump Facility site. The measurement locations are summarised in Table 13-6.

Table 13-6 – Baseline Measurement Locations

Ref.	Approximate measurement location	Description
P1	538124E, 421490N	Spring Farm Bungalow to the north-west of the Pump Facility
P2	537970E, 420970N	Southfield Farm to the west of the Pump Facility
P3	538277E, 419448N	Sunnybank to the south of the Pump Facility
P4	539311E, 419479N	Two Hoots to the south of the Pump Facility
P5	539598E, 420901N	Coastal path to the east of the Pump Facility

13.4.8 Refer to Volume 4: Appendix 13.1: Baseline Noise Survey for further information regarding the baseline noise survey.

13.4.9 The results of the baseline noise survey will be used to inform the operational phase noise impact assessment for the Pump Facility, in accordance with the methodology set out in BS 4142 (Ref 13.10).

Impact Assessment Methodology

Construction Phase and Decommissioning Phase – Noise

- 13.4.10 Construction activities will involve the use of a variety of working methods, for which an estimate of the expected noise levels over a representative period has been prepared, in accordance with industry best practice.
- 13.4.11 Noise levels from the construction works experienced by a receptor will vary over time as the distances to noise producing plant and the type of construction activity change. This reflects the transient nature of the construction works for the pipeline.
- 13.4.12 Noise predictions have been undertaken based on the methodology contained within BS 5228-1 (Ref 13.11). The noise predictions have been used to determine whether the construction phase and decommissioning phase activities have the potential to result in significant adverse effects at the surrounding noise sensitive receptors. The prediction method considers the noise emission level of the proposed plant items, the separation distance between the source and the receptor, and the intervening ground conditions.
- 13.4.13 To inform the noise prediction calculations, the separation distances between the proposed construction working width and the surrounding sensitive receptors have been derived using AddressBase mapping data, the current pipeline alignment, AGI extents and compound locations.
- 13.4.14 Due to the nature of the land within the defined Study Area, soft ground attenuation has been adopted for the construction phase noise predictions. No allowance has been made for acoustic screening provided by intervening landforms or structures.
- 13.4.15 Standard construction working hours are likely to be Monday-Saturday 07:00 to 19:00 hrs. However, 24-hour working will be required to align with critical work activities. At this stage, it has been assumed that all trenchless crossings will require 24-hour working. For the ES, a reasonable worst-case scenario for each construction activity will be identified and assessed. Mitigation measures will be determined through the assessment and implemented as needed to ensure that the residual effects will not be significant.
- 13.4.16 The significance criteria given in Annex E.2 of BS 5228-1 (Ref 13.11) have been used to assess the noise effects during the construction and decommissioning phases. The methodology within Annex E.2 adopts the use of fixed threshold levels at noise sensitive receptors in the vicinity of the proposed

construction works. Refer to Volume 4 - Appendix 13.2: Construction Phase Significance Criteria for further information on the BS 5228-1 (Ref 13.11) criteria.

- 13.4.17 Unless ambient noise levels within the defined Study Area are sufficiently high to provide masking of construction noise, the lower bound daytime cut-off value of 65 dB $L_{Aeq,T}$ applies. For evening (plus non-core weekend daytime) and night-time periods, this reduces to 55 dB $L_{Aeq,T}$ and 45 dB $L_{Aeq,T}$ respectively. As a result of these lower bound threshold levels, baseline measurement data does not need to be collected along the length of the draft Order Limits to derive the acoustic criteria.
- 13.4.18 To predict the likely noise levels associated with the Project, the construction works have been divided into the phases / activities set out below. Plant lists for each activity are provided in Volume 4 - Appendix 13.3: Construction Phase Plant Lists.
- Site preparation.
 - Access works.
 - Trenching.
 - Pipeline fabrication.
 - Pipeline and cable installation.
 - Trench backfilling.
 - Reinstatement.
 - Trenchless techniques – HDD, civils works.
 - Trenchless techniques – HDD, drilling works.
 - Trenchless techniques – Auger bore / micro tunnelling / tunnelling, civils works.
 - Trenchless techniques – Auger bore / micro tunnelling / tunnelling works.
 - The construction of the Temporary Construction Compounds.
 - AGI and Pump Facility Construction, and
 - Temporary Construction Compound reinstatement.
- 13.4.19 At this stage, the design and construction methodology associated with the River Humber crossing is still being developed and therefore an assessment of this does not form part of the PEIR.
- 13.4.20 This will form part of the ES, with construction phase noise and vibration assessments undertaken in accordance with BS 5228-1 (Ref 13.11) and BS 5228-2 (Ref 13.12) respectively.

- 13.4.21 During the decommissioning phase of the Project, the resultant noise levels are expected to be broadly similar to those generated during the construction phase, albeit localised to the AGIs based on the assumption that the buried pipelines would remain in situ.

Construction Phase and Decommissioning Phase – Vibration

- 13.4.22 Certain construction works can produce ground-borne vibration, which has the potential to give rise to impacts at sensitive receptors including buildings, transport infrastructure and watercourses.
- 13.4.23 Construction induced vibration levels have been predicted using the empirical formula contained in Annex E of BS 5228-2 (Ref 13.12). The vibration levels have been assessed against the relevant Peak Particle Velocity (PPV) threshold levels within the standard.
- 13.4.24 The significance criteria for the construction and decommissioning phase vibration levels have been derived from Annex B of BS 5228-2 (Ref 13.12). Refer to Volume 4 - Appendix 13.2: Construction Phase Significance Criteria for further information on the BS 5228-2 (Ref 13.12) vibration criteria.
- 13.4.25 For human receptors, a PPV vibration level of 1.0 mm/s has been adopted as the threshold for potentially significant vibration impacts. Beyond this level, it is likely that vibration in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
- 13.4.26 The main source of vibration associated with the Project is expected to be attributable to vibratory compaction, vibratory piling activities associated with the trenchless crossings, and tunnelling. These sources have therefore been considered as part of a quantitative assessment. It is noted that piling is likely to only be used at the River Humber and River Trent crossings, although at this stage it is possible it will be used at trenchless crossings throughout the draft Order Limits.

Operational Phase – Pump Facility

- 13.4.27 At this stage, the exact configuration of the Pump Facility has not been defined. The details of noise emitting plant / equipment associated with the Pump Facility is therefore not currently available to inform operational phase noise predictions.
- 13.4.28 In the absence of design information, BS 4142 (Ref 13.10) rating noise limits have been provided for the impact magnitude categories set out in Table 13-8.

The criteria are set relative to the baseline noise levels measured at receptors surrounding the Pump Facility.

Sensitivity

13.4.29 Receptor sensitivity has been categorised for a range of receptor types, with the categorisation informed by guidance contained in the following documents:

- DMRB document Ref. LA 111 'Noise and Vibration' (Ref 13.19), and
- IEMA document 'Guidelines for Environmental Noise Impact Assessment' (Ref 13.20).

13.4.30 Table 13-7 presents the proposed receptor sensitivity categorisation for the Project.

Table 13-7 – Receptor Sensitivity

Receptor Sensitivity	Type of Receptor
High	Residential properties, educational establishments, hospitals, places of worship, hotels, children's nurseries, nursing homes, international / national or statutory designated sites
Medium	Commercial premises including offices, halls, public municipal areas, bars, public rights of way and restaurants
Low	Industrial premises
Negligible	All other areas, such as those used primarily for agricultural purposes

Magnitude of effect

13.4.31 The magnitude of the impact within this assessment has been described using the following scale:

- High.
- Medium.
- Low, and
- Negligible.

13.4.32 Although the lowest measure of magnitude of effect is defined as 'Negligible', it should be noted that noise and vibration levels may still be audible / perceptible during the construction and operational phases.

- 13.4.33 The criteria in Table 13-8 have been adopted for the assessment of magnitude of impact.

Table 13-8 – Magnitude of Impact Criteria

Impact	Magnitude Criteria			
	Negligible	Low	Medium	High
Construction & decommissioning phases – daytime noise	Less than 55 dB $L_{Aeq,T}$	Between 55 & 65 dB $L_{Aeq,T}$	Between 65 & 75 dB $L_{Aeq,T}$	Greater than 75 dB $L_{Aeq,T}$
Construction & decommissioning phases – evening noise	Less than 50 dB $L_{Aeq,T}$	Between 50 & 55 dB $L_{Aeq,T}$	Between 55 & 65 dB $L_{Aeq,T}$	Greater than 65 dB $L_{Aeq,T}$
Construction & decommissioning phases – night-time noise	Less than 40 dB $L_{Aeq,T}$	Between 40 & 45 dB $L_{Aeq,T}$	Between 45 & 55 dB $L_{Aeq,T}$	Greater than 55 dB $L_{Aeq,T}$
Construction phase - road traffic noise	Less than 1 dB increase in road traffic noise	1.0 to 2.9 dB increase in road traffic noise	3.0 to 4.9 dB increase in road traffic noise	Greater than or equal to 5 dB increase
Construction & decommissioning phases - vibration	Less than 0.3 mm/s PPV	0.3 to less than 1.0 mm/s PPV	1.0 to 9.9 mm/s PPV	Greater than or equal to 10 mm/s PPV
Operational phase - noise	In excess of 5 dB(A) below background sound level	In the range of 5 dB(A) below and 5 dB(A) above background sound level	Between 5 and 10 dB(A) above background sound level	In excess of 10 dB(A) above background sound level

Impact	Magnitude Criteria			
	Negligible	Low	Medium	High

Notes:

1. Daytime construction phase noise levels are based on a time period 'T' which equates to the duration of a working period on site.
2. The construction noise impact criteria will apply if the works occur for a duration exceeding 10 or more days or nights in any 15 consecutive days or nights: or a total number of days exceeding 40 in any 6 consecutive months.
3. Operational phase noise criteria is based on rated noise levels at residential receptors and will be subject to context, in accordance with BS 4142 (Ref 13.10).

Significance

- 13.4.34 The overall significance of an effect will be determined by combining the sensitivity of the receptor and magnitude (as presented in Table 13-9). The assessment of significance relies on best practice and the relevant published standards and guidance documents as defined in Section 13.2.
- 13.4.35 The significance of an effect is reported as either 'significant' or 'not significant' under the terms of the EIA Regulations. Where impact significance is assessed as 'Negligible' or 'Minor', the overall effect is not significant. Where the impact significance is assessed as 'Moderate' or 'Major', the overall effect is significant.

Table 13-9 – Determining Significance of Effects

Magnitude	Sensitivity of receptor / receiving environment to change			
	High	Medium	Low	Negligible
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

13.5 Baseline Conditions

Existing Baseline

Desk study

- 13.5.1 The majority of the draft Order Limits area is located within a rural setting, typically comprising agricultural land use. The acoustic environment will vary significantly along the draft Order Limits depending on proximity to prominent noise sources; these sources include agricultural activities, road and rail infrastructure, industrial facilities, commercial premises / activities, wind turbines, an airport and the North Sea.
- 13.5.2 Due to the nature of the Project, the draft Order Limits flank substantial industrial facilities in several areas. In these areas, noise emissions from the existing facilities have the potential to be prominent at the nearest surrounding receptors.
- 13.5.3 Included within the draft Order Limits are several major transport infrastructure routes including the M18 and M62 motorways. At locations where the route

crosses or is in close proximity to motorways, trunk roads, rail lines and runways, noise from road, rail and air traffic would typically dominate the acoustic environment, particularly during the daytime.

13.5.4 The quantity of sensitive receptors in the vicinity of the draft Order Limits varies significantly along the length of the Project. The location of sensitive receptors within the defined Study Area has been determined using AddressBase data and aerial imagery.

13.5.5 There are various statutory designated sites within or close to the draft Order Limits, as defined Volume 3 - Figure 7.1: Statutory Designated Sites, including Special Protection Areas, Ramsar sites, Special Areas of Conservation and Sites of Special Scientific Interest.

Site Survey

13.5.6 Table 13-10 presents the results of the baseline noise survey undertaken at sensitive receptors situated in the vicinity of the Pump Facility at Easington. The table also provides the representative background sound level for the daytime and night-time periods following a statistical analysis undertaken in accordance with BS 4142 (Ref 13.10).

Table 13-10 – Measured Noise Levels

Ref.	Time period	Measured noise levels		Representative background sound level
		L _{Aeq,T}	L _{A90,T}	
P1	Daytime	46 - 60 dB L _{Aeq,16hr}	34 - 42 dB L _{A90,16hr}	35 dB L _{A90,60min}
	Night-time	40 - 42 dB L _{Aeq,8hr}	31 - 38 dB L _{A90,8hr}	33 dB L _{A90,15min}
P2	Daytime	45 - 60 dB L _{Aeq,16hr}	36 - 43 dB L _{A90,16hr}	37 dB L _{A90,60min}
	Night-time	42 - 45 dB L _{Aeq,8hr}	34 - 39 dB L _{A90,8hr}	34 dB L _{A90,15min}
P3	Daytime	46 - 57 dB L _{Aeq,16hr}	32 - 40 dB L _{A90,16hr}	31 dB L _{A90,60min}
	Night-time	49 - 50 dB L _{Aeq,8hr}	28 - 36 dB L _{A90,8hr}	29 dB L _{A90,15min}
P4	Daytime	46 - 60 dB L _{Aeq,16hr}	37 - 43 dB L _{A90,16hr}	37 dB L _{A90,60min}
	Night-time	38 - 40 dB L _{Aeq,8hr}	32 - 40 dB L _{A90,8hr}	33 dB L _{A90,15min}
P5	Daytime	50 - 57 dB L _{Aeq,16hr}	47 - 52 dB L _{A90,16hr}	48 dB L _{A90,60min}
	Night-time	50 - 55 dB L _{Aeq,8hr}	48 - 51 dB L _{A90,8hr}	48 dB L _{A90,15min}

Future Baseline

- 13.5.7 On the basis that the majority of the draft Order Limits are located within a rural setting, typically comprising agricultural land use, there is generally not expected to be significant changes to the baseline conditions in the future.
- 13.5.8 In instances where the draft Order Limits are located close to transport infrastructure, such as roads and rail lines, there is potential for growth in the traffic flows in the future baseline scenario. In the absence of significant alterations to the wider road or rail network, the variation in traffic flows would be expected to be incremental and therefore unlikely to give rise to perceptible changes in the acoustic environment.
- 13.5.9 Where the draft Order Limits are located close to prominent industrial and power generating facilities including carbon capture projects, there is potential that the noise levels generated by these facilities may change as a result of any new development. These changes are not expected to alter the acoustic environment significantly for the surrounding sensitive receptors, as this would be controlled via the planning / permitting processes, as applicable.

13.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 13.6.1 Where practicable, the alignment of the pipeline has been designed to maximise the separation distances to surrounding sensitive receptors.

Embedded Mitigation

- 13.6.2 BPM as defined by the Control of Pollution Act 1974 (Ref 13.1) will be implemented which will serve to minimise the noise and vibration impacts at receptors in the vicinity of the construction and decommissioning phase works. The BPM measures that would typically be implemented are listed below which would be briefed to all relevant parties via site inductions, toolbox talks and at start of shift briefings:
- Where practicable, temporary enclosures should be used to screen all static or semi-static plant from noise sensitive receptor locations.
 - Drop heights of materials should be minimised, i.e. lorry with lifting boom or dumper carefully depositing materials.

- Operators of moving plant to be briefed on a regular basis with an emphasis on the importance of noise mitigation and avoiding movements over irregular surfaces (which tends to create more noise / vibration emissions).
- At all times, workers' shouting or raised voices to be kept to a minimum.
- All plant and equipment should comply with the noise limit and noise marking requirements.
- All plant, equipment and noise control measures applied to plant and equipment should be maintained in good and efficient working order and operated such that noise and vibration emissions are minimised as far as reasonably practicable. Any plant, equipment or items fitted with noise control equipment found to be defective will not be operated until repaired.
- All plant and equipment should be maintained so they are kept in good running order which ensures optimum performance.
- Machines in intermittent use should be shut down or throttled down to a minimum during periods between works.
- As far as is reasonably practicable, the location and orientation of semi-static equipment should be chosen to minimise the noise impact on sensitive receptors.
- All personnel on site should undergo site specific inductions and briefings. Where relevant, specific noise and vibration control measures should be incorporated into the contractor's method statements, and
- Where safe to do so, noise from reversing alarms will be controlled and limited as far as possible through the use of a banksman or other means.

13.7 Preliminary Assessment of Potential Impacts

Construction

Construction phase and decommissioning phase – noise

13.7.1 Table 13-11 presents the predicted construction phase noise levels associated with the primary construction activities, at a reference distance of 10 m.

Table 13-11 – Predicted Construction Noise Levels at 10 m (free-field)

Construction activity	Activity noise level at 10 m
Site preparation	85 dB $L_{Aeq,T}$
Access works	87 dB $L_{Aeq,T}$
Trenching	85 dB $L_{Aeq,T}$

Construction activity	Activity noise level at 10 m
Pipeline fabrication	87 dB L _{Aeq,T}
Pipeline and cable installation	84 dB L _{Aeq,T}
Trench backfilling	86 dB L _{Aeq,T}
Reinstatement	87 dB L _{Aeq,T}
HDD, civils works	82 dB L _{Aeq,T}
HDD, drilling works	84 dB L _{Aeq,T}
Auger bore / micro tunnelling / tunnelling, civils works	87 dB L _{Aeq,T}
Auger bore / micro tunnelling / tunnelling works	77 dB L _{Aeq,T}
Compound construction	86 dB L _{Aeq,T}
AGI and Pump Facility Construction	86 dB L _{Aeq,T}
Compound reinstatement	86 dB L _{Aeq,T}

- 13.7.2 The values provided in Table 13.12 represent the minimum separation distance required to not exceed the BS 5228-1 (Ref 13.11) threshold criteria. The distances are based on free-field noise levels and assume that plant / equipment associated with each construction task is operating in a similar work area. Evening and night-time values are presented for the trenchless crossings where out of hours working is anticipated.

Table 13.12 – Separation Distances for Noise Construction Limits

Construction activity	Minimum separation distance to avoid BS 5228-1 Category A exceedances		
	Daytime, 65 dB L _{Aeq,T}	Evening, 55 dB L _{Aeq,T}	Night-time 45 dB L _{Aeq,T}
Site preparation	80 m	-	-
Access works	90 m	-	-
Trenching	80 m	-	-
Pipeline fabrication	90 m	-	-
Pipeline and cable installation	70 m	-	-
Trench backfilling	85 m	-	-
Reinstatement	90 m	-	-

Construction activity	Minimum separation distance to avoid BS 5228-1 Category A exceedances		
	Daytime, 65 dB L _{Aeq,T}	Evening, 55 dB L _{Aeq,T}	Night-time 45 dB L _{Aeq,T}
HDD, civils works	60 m	-	-
HDD, drilling works	70 m	175 m	440 m
Auger bore / micro tunnelling / tunnelling, civils works	90 m	-	-
Auger bore / micro tunnelling / tunnelling works	40 m	90 m	230 m
Compound construction	85 m	-	-
AGI and Pump Facility Construction	85 m	-	-
Compound reinstatement	85 m	-	-

13.7.3 Table 13-13 identifies the number of receptors that are predicted to experience daytime noise levels in excess of 65 dB L_{Aeq,T} as a result of the construction works.

Table 13-13 – Number of Properties Exceeding Threshold Criteria – Daytime Work

Construction activity	Number of receptors exceeding 65 dB L _{Aeq,T} daytime criteria	
	High sensitivity receptors	Medium sensitivity receptors
Site preparation	1	1
Access works	2	1
Trenching	1	1
Pipeline fabrication	2	1
Pipeline and cable installation	2	1
Trench backfilling	2	1
Reinstatement	2	1

Construction activity	Number of receptors exceeding 65 dB $L_{Aeq,T}$ daytime criteria	
	High sensitivity receptors	Medium sensitivity receptors
Auger bore / micro tunnelling / tunnelling, civils works	3	0
Auger bore / micro tunnelling / tunnelling works	0	0
Compound construction	14	1
AGI and Pump Facility Construction	0	0
Compound reinstatement	14	1

- 13.7.4 Table 13-14 identifies the number of receptors that are predicted to experience night-time noise levels in excess of 45 dB $L_{Aeq,T}$ as a result of the trenchless crossings.

Table 13-14 – Number of Properties Exceeding Threshold Criteria – Night-time Work

Construction activity	Number of receptors exceeding 45 dB $L_{Aeq,T}$ night-time criteria	
	High sensitivity receptors	Medium sensitivity receptors
Auger Bore / Mirco tunnelling works	13	5

- 13.7.5 Given the scale of the draft Order Limits and the separation distances to surrounding receptors, it is expected that the majority of the unmitigated construction works could be undertaken without causing an exceedance of the daytime 65 dB $L_{Aeq,T}$ threshold criterion. However, it can be seen from Table 13-13 that the 65 dB $L_{Aeq,T}$ threshold criteria would be exceeded at a limited number of receptors as a result of the daytime construction works, where mitigation would be applied.
- 13.7.6 For the trenchless crossing works which are scheduled to take place on a 24-hour basis, the number of receptors that are predicted to experience noise

levels above the 45 dB $L_{Aeq,T}$ night-time threshold criterion are up to 13 for high sensitivity receptors and 5 for medium sensitivity receptors.

- 13.7.7 The increase in affected receptors during the night whilst the trenchless crossing works are taking place is a result of the acoustic criterion for the period, which is significantly more stringent than that for the daytime.
- 13.7.8 On the basis of the assessment, the magnitude of impact at high sensitivity receptors is considered to be up to high. This would therefore require additional mitigation measures to be introduced to control the noise emissions from the works in certain areas. Refer to the Additional Mitigation and Enhancement Measures section below.

Construction phase and decommissioning phase – vibration

- 13.7.9 The following tables present the predicted construction induced vibration levels associated with vibratory compaction works (Table 13-15), vibratory piling works (Table 13-16) and tunnelling (Table 13-17).

Table 13-15 – Vibration Generated by Vibratory Compaction Plant

Activity	Scaling factor & probability of exceedance	PPV at a range of setback distances, mm/s			
		25 m	50 m	75 m	100 m
Vibratory compaction	Ks = 276 (5%)	2.3	0.8	0.5	0.3
	Ks = 143 (33.3%)	1.2	0.4	0.2	0.2
	Ks = 75 (50%)	0.6	0.2	0.1	0.1
Calculation Parameters: • Bomag BW 216 DH-5 single drum roller (17.9 tonne gross weight), operating at the lower range compaction amplitude, equating to an amplification value of 1.1mm • Calculations based on steady state compaction rather than start up and run-down condition • No allowance made for external to internal transfer function					

Table 13-16 – Vibration Generated by Vibratory Piling Activities

Activity	Scaling factor & probability of exceedance	PPV at a range of setback distances, mm/s			
		25 m	50 m	75 m	100 m
Vibratory piling	Kv = 266 (5%)	4.1	1.6	1.0	0.7
	Kv = 126 (33.3%)	1.9	0.8	0.5	0.3
	Kv = 60 (50%)	0.9	0.4	0.2	0.2
Calculation Parameters: • Calculations based on ‘all operations’, rather than ‘steady state operation’ or ‘start up and run-down’ conditions. • No allowance made for external to internal transfer function					

Table 13-17 – Groundborne Vibration Generated by Tunnelling Works

Activity	PPV at a range of setback distances, mm/s			
	25 m	50 m	75 m	100 m
Tunnelling (groundborne vibration)	2.7	1.1	0.7	0.5
Calculation Parameters: • Setback distances are measured along the ground surface. • No allowance made for external to internal transfer function				

- 13.7.10 Based on the predicted vibration levels for the most onerous scaling factor (where applicable), the setback distance at which a PPV level would exceed the 1 mm/s threshold criterion is 45 m for vibratory compaction, 75 m for vibratory piling work associated with the trenchless crossings and 55 m for tunnelling works.
- 13.7.11 Table 13-18 identifies the number of residential receptors that are predicted to experience vibration levels in excess of the 1 mm/s PPV threshold level as a result of the construction works.

Table 13-18 – Number of Properties Exceeding Vibration Criteria

Activity	1 mm/s PPV threshold setback distance (m)	Number of residential receptors exceeding criterion
Vibratory compaction – Pipeline	45	0
Vibratory compaction – AGIs and Pump Facility	45	0
Vibratory compaction – Temporary Compounds	45	7
Trenchless crossings – Piling	75	1
Trenchless crossings – Tunnelling	55	0

- 13.7.12 It can be seen from Table 13-18 that the 1 mm/s PPV threshold criterion has the potential to be exceeded at a limited number of receptors during the construction works. Given the scale of the draft Order Limits and the separation distances to surrounding receptors, it is expected that the majority of the construction works could be undertaken without causing an exceedance of the 1 mm/s PPV threshold criterion.
- 13.7.13 On the basis of the assessment, the magnitude of impact at high sensitivity receptors is considered to be up to medium. This would therefore require additional mitigation measures to be introduced to control the noise emissions from the works in certain areas. Refer to the Additional Mitigation and Enhancement Measures section below.
- 13.7.14 The potential impacts for noise and vibration associated with the construction phase are provided in Table 13-19.

Table 13-19 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Occupants of sensitive receptors	High	High daytime noise levels generated by the construction phase activities resulting in potential disturbance or interference with activities.	Up to high	Short term	Adverse	Direct
Occupants of sensitive receptors	High	High night-time noise levels generated by the trenchless crossing activities resulting in potential sleep disturbance.	Up to high	Short term	Adverse	Direct
Occupants of sensitive receptors	High	Vibration generated by the construction phase activities resulting in potential disturbance or interference with activities.	Up to medium	Short term	Adverse	Direct

Operation

- 13.7.15 As noted above, the configuration of the Pump Facility has not been defined at this stage and therefore the details of noise emitting plant / equipment associated with the Pump Facility is not currently available to inform operational phase noise predictions.
- 13.7.16 The noise emissions from the CO₂ pumps associated with the Pump Facility would be dependent upon the unit specification which would be confirmed during the procurement phase. Based on data from a representative example unit, it is expected that the noise emissions from each pump would not exceed 85 dB(A) at 1 m. Only four pumps would be in operation at any time, with the fifth unit used as a backup.
- 13.7.17 Similarly, the noise emissions from the carbon dioxide (CO₂) recycle coolers which are associated with the CO₂ pump units would also depend upon the specification of the equipment chosen during procurement. It is expected that the noise emissions from each unit would not exceed 85 dB(A) at 1 m. There would be a maximum of four recycle coolers operating at any one time.
- 13.7.18 Table 13-20 presents the BS 4142 (Ref 13.10) rating noise limits for the impact magnitude categories set out in Table 13-8. The rating limits are provided for the four baseline monitoring positions carried out at residential receptors (positions P1 to P4). The criteria will be subject to context in accordance with the BS 4142 (Ref 13.10) assessment methodology.

Table 13-20 – Operational phase magnitude of impact criteria

Survey Ref.	Time period	Representative background sound level, (dB L _{A90,T})	Rating noise level criteria (dB L _{A,r,Tr})			
			Negligible	Low	Medium	High
P1	Daytime	35	<30	30 – 40	>40 – 45	>45
	Night-time	33	<28	28 – 38	>38 – 43	>43
P2	Daytime	37	<32	32 – 42	>42 – 47	>47
	Night-time	34	<29	29 – 39	>39 – 44	>44
P3	Daytime	31	<26	26 – 36	>36 – 41	>41
	Night-time	29	<24	24 – 34	>34 – 39	>39
P4	Daytime	37	<32	32 – 42	>42 – 47	>47
	Night-time	33	<28	28 – 38	>38 – 43	>43
• Negligible impact - In excess of 5 dB(A) below background sound level • Low impact - In the range of 5 dB(A) below and 5 dB(A) above background sound level • Medium impact - Between 5 and 10 dB(A) above background sound level • High impact - In excess of 10 dB(A) above background sound level						

- 13.7.19 To avoid a significant adverse effect at the surrounding residential receptors, the rating noise levels generated by the Pump Facility will need to fall within the 'Negligible' or 'Low' impact magnitude criteria as defined in Table 13-8 (subject to context). This will be assessed and results presented within the ES.
- 13.7.20 The potential impacts for noise and vibration associated with the operational phase are provided in Table 13-21.

Table 13-21 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Occupants of sensitive receptors	High	Noise levels generated by the operation of the Pump Facility resulting in potential disturbance or interference with activities.	To be determined at ES stage	Long term	Adverse	Direct

Decommissioning

- 13.7.21 During the decommissioning phase of the Project, the resultant noise and vibration levels are expected to be broadly similar to those generated during the construction phase, albeit localised to the Pump Facility and AGIs. The decommissioning phase activities at the various AGI sites would be undertaken during core daytime hours, consistent with the construction phase.
- 13.7.22 During the construction of the AGIs, the assessment has identified that significant adverse effects are not anticipated. Therefore, a similar outcome would be expected for the decommissioning phase.
- 13.7.23 The potential impacts for noise and vibration associated with the decommissioning phase are provided in Table 13-22.

Table 13-22 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Occupants of sensitive receptors	High	High noise and vibration levels generated by the decommissioning phase activities resulting in potential disturbance or interference with activities.	Low	Short term	Adverse	Direct

13.8 Additional Mitigation and Enhancement Measures

- 13.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 13.7.

Construction

- 13.8.2 Construction phase noise levels above the daytime and night-time threshold criterion have been predicted at a limited number of receptors. To address this, specific mitigation measures will be introduced which would be included in the CEMP and secured through the Register of Commitments.

Noise Barriers / Enclosures

- 13.8.3 To minimise the impact of daytime construction noise levels at the most exposed receptors, temporary acoustic barriers would be installed at the boundary of the work areas at strategic locations. The barriers would be situated to ensure that an enhanced level of noise attenuation is provided to the most exposed receptors.
- 13.8.4 Temporary noise barriers typically comprise earth bunds, solid fencing, or proprietary acoustic screening systems. BS 5228-1 (Ref 13.11) states that the approximate acoustic attenuation provided by a barrier would be 5 dB when the top of the plant is just visible to the receiver over the noise barrier and 10 dB when the barrier completely hides the noise sources from the receiver.
- 13.8.5 For the trenchless crossings which require construction work to be carried out beyond the core daytime hours, an enhanced level of noise attenuation will be required to minimise the potential for sleep disturbance during the night. Specific mitigation measures will be introduced which would be included in the CEMP and secured through the Register of Commitments. At this stage, it is anticipated that the mitigation measures will include:
- The erection of temporary noise barriers where the noise level exceedances are within 10 dB of the 45 dB $L_{Aeq,T}$ acoustic criterion, and
 - The erection of temporary acoustic enclosures or equivalent means of attenuation around the main noise emitting sources where the exceedances are in excess of 10 dB above the 45 dB $L_{Aeq,T}$ acoustic criterion.

Vibratory Compaction Plant

- 13.8.6 To address the potential exceedances of the vibration criterion in a limited number of areas, specific mitigation measures may need to be introduced. At this stage, it is expected that vibration will be controlled through the selection of vibratory compaction plant which generate lower levels of vibration. This is likely to be necessary when working within 45 m of off-site residential properties. This may dictate the use of smaller plant items which compact material in thinner layers.
- 13.8.7 The vibration control measures would be included in the CEMP and secured through the Register of Commitments.

Community Liaison

- 13.8.8 To reduce the likelihood of complaints being received, community liaison and communication throughout the construction phase will be undertaken to provide information to people residing in properties located in the vicinity of the draft Order Limits. The community liaison would extend to landowners with livestock or other animals that may be present in fields adjacent to the construction works. The coverage of the community liaison will be determined during the ES stage.
- 13.8.9 The level of engagement required would vary during the construction period, depending upon the likely impacts experienced by individual receptors due to the construction works.
- 13.8.10 Details relating to liaison with the local community would be managed by the Main Works Contractor (and others). It is envisaged that community liaison will provide local residents with the following information in relation to the construction works:
- The nature of the works being undertaken.
 - The expected duration of the works and the contractor's working hours.
 - Mitigation measures that have been adopted to minimise noise and vibration, and
 - Contact details in the event of a noise disturbance.
- 13.8.11 The Community Liaison Plan will be secured through the Register of Commitments.

Operation

- 13.8.12 The requirements for noise mitigation measures for the Pump Facility have not been defined at this stage, as the details of noise emitting plant / equipment associated with the Pump Facility are not currently available to inform operational phase noise predictions.

Decommissioning

- 13.8.13 No additional mitigation measures are anticipated at this preliminary stage.

13.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 13.9.1 Table 13-23 below summarises the preliminary assessment of potential significant effects associated with the Project.

Table 13-23 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Occupants of sensitive receptors	High	Construction	High daytime noise levels generated by the construction phase activities resulting in potential disturbance or interference with activities.	Short term	BPM, introduction of noise barriers, acoustic enclosures.	Not significant
Occupants of sensitive receptors	High	Construction	High night-time noise levels generated by the trenchless crossing activities resulting in potential sleep disturbance.	Short term	BPM, introduction of noise barriers, acoustic enclosures.	Not significant
Occupants of sensitive receptors	High	Construction	Vibration generated by certain construction activities resulting in potential disturbance or interference with activities.	Short term	Alternative plant selection which generates lower levels of vibration.	Not significant
Occupants of sensitive receptors	High	Operation	Noise levels generated by the operation of the Pump Facility resulting in potential disturbance or interference with activities.	Long term	To be determined at ES stage	To be determined at ES stage

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Occupants of sensitive receptors	High	Decommissioning	High noise and vibration levels generated by the decommissioning phase activities resulting in potential disturbance or interference with activities.	Short term	BPM	Not significant

13.10 Limitations and Assumptions

- 13.10.1 The construction and decommissioning assessments have assumed the use of standard construction techniques commensurate for the type of works being undertaken. The final techniques, plant selection and programme are expected to be determined by the Main Works Contractor, in consultation with relevant authorities prior to commencement of construction. The assessment will be refined during the preparation of the ES, as further information becomes available.
- 13.10.2 The selection of trenchless crossing techniques that have been used to inform the PEIR construction phase assessment has been based on preliminary design information. The number of trenchless crossing and techniques to be used may be subject to change at ES stage as the design progresses.
- 13.10.3 At this stage, the construction methodology associated with the River Humber crossing is still to be determined and therefore this does not form part of the PEIR. This will form part of the ES, with construction phase noise and vibration assessments undertaken in accordance with BS 5228-1 (Ref 13.11) and BS 5228-2 (Ref 13.12) respectively.
- 13.10.4 For the purposes of assessing potential construction impacts, it has been assumed that each construction phase / activity will be separated by either time or distance within the draft Order Limits, such that cumulative noise levels experienced by surrounding sensitive receptors will not be significant.
- 13.10.5 During the decommissioning phase of the Project, it is assumed that the resultant noise levels will be broadly similar to the construction phase, albeit localised to the AGIs on the basis that the buried pipelines would remain in situ.
- 13.10.6 The details of noise emitting plant / equipment associated with the Pump Facility have not been defined at this stage. In light of this, rated noise criteria have been provided.
- 13.10.7 The assessment does not currently account for cumulative effects as a result of the Project in combination with other committed developments. The scope of projects to be considered in the cumulative assessment will be agreed at the ES stage with the relevant local authorities.

13.11 Next Steps

Design development

- 13.11.1 The noise and vibration assessment will be updated to reflect design development that occurs during the preparation of the ES.

Engagement

- 13.11.2 The following elements will be subject to ongoing consultation and engagement:
- The outcome of the operational phase assessment for the Pump Facility including the mitigation measures to be adopted where necessary, and
 - The committed developments to be considered as part of a cumulative effects assessment.

Surveys

- 13.11.3 It is intended that an additional baseline noise survey will be undertaken to inform the noise assessment for the trenchless crossing of the River Humber.

Further Assessment

Construction

- 13.11.4 The following construction phase elements will either be undertaken or refined for the ES:
- Assessment of noise and vibration levels generated by the River Humber trenchless crossing works.
 - Assessment of traffic flow fluctuations on the public highway (and private roads) during the various construction phases of the Project. This will be calculated using the methodology set out in the CRTN publication (Ref 13.17), using flow data provided by the Project traffic consultant.
 - Assessment of construction traffic on the various temporary site access routes using the haul route method outlined in Section F.2.5 of BS 5228-1 (Ref 13.11). The assessment will consider the flow data provided by the Project traffic consultant.
 - Refinement of the construction noise and vibration assessment where applicable to reflect additional information made available from the Project team. If appropriate, this will include an assessment of construction activities of an impulsive nature against shorter $L_{Aeq,T}$ averaging periods in line with Section 8.5.2.5 of BS 5228-1 (Ref 13.11). This will be utilised

within Chapter 7: Ecology and Biodiversity to inform the assessment of noise on non-residential receptors.

- Appraisal of construction induced vibration affecting infrastructure assets, including those highlighted by the Canal & River Trust.
- Appraisal of construction induced noise levels affecting users of the PRow.
- Consideration of potential cumulative effects as a result of the Project in combination with other committed developments.
- The outline scope of construction phase compliance monitoring.

Operation

13.11.5 The following operational phase elements will be undertaken as part of the ES:

- Preparation of a noise prediction model for the Pump Facility which will account for the proposed site layout, noise emitting plant / equipment to be introduced and any embedded acoustic mitigation measures.
- An operational phase noise assessment for the Pump Facility undertaken in accordance with the methodology outlined in BS 4142 (Ref 13.10). This will identify the requirement for additional mitigation measures.
- Consideration of potential cumulative effects as a result of the Project in combination with other committed developments.

13.12 References

- Ref 13.1: Secretary of State (1974) The Control of Pollution Act. Available at: <https://www.legislation.gov.uk/ukpga/1974/40> (Accessed: July 2025).
- Ref 13.2: Secretary of State (1990) The Environmental Pollution Act. Available at: <https://www.legislation.gov.uk/ukpga/1990/43/contents> (Accessed: July 2025).
- Ref 13.3: Department for Energy Security & Net Zero (2024) Overarching National Policy Statement for Energy (EN-1). Available at: <https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf> (Accessed: July 2025).
- Ref 13.4: Department for Energy Security & Net Zero (2024) National Policy Statement for natural gas supply infrastructure and gas and oil pipelines (EN-4). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-natural-gas-supply-infrastructure-and-gas-and-oil-pipelines-en-4> (Accessed: October 2024).

- Ref 13.5: Ministry of Housing, Communities & Local Government (2023) National Planning Policy Framework. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2> (Accessed: July 2025).
- Ref 13.6: 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> (Accessed: July 2025).
- Ref 13.7: East Riding Local Plan Update 2020-2039 (Adopted April 2025). Available at: <https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/east-riding-local-plan-update/> (Accessed: July 2025).
- Ref 13.8: North Yorkshire Council (2024) Selby Local Plan. Available at: <https://edemocracy.northyorks.gov.uk/documents/s28009/Appendix%20%20Revised%20Publication%20Local%20Plan%20Consultation%20Document.pdf> (Accessed: October 2024).
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- Ref 13.10: British Standards Institution (2019) British Standard 4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sound. London: British Standard Institution.
- Ref 13.11: British Standards Institution (2014) British Standard 5228-1:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites (Part 1: Noise). London: British Standard Institution.
- Ref 13.12: British Standards Institution (2014) British Standard 5228-2:2009+A1:2014, Code of practice for noise and vibration control on construction and open sites (Part 2: Vibration). London: British Standard Institution.
- Ref 13.13: British Standards Institution (2003) British Standard 7445:2003, Description and measurement of environmental noise (Part 1: Guide to quantities and procedures). London: British Standard Institution.
- Ref 13.14: British Standards Institution (2018) British Standard EN 60942:2018, Electroacoustics – Sound calibrators. London: British Standard Institution.
- Ref 13.15: British Standards Institution (2013) British Standard EN 61672-1:2013, Electroacoustics - Sound level meters (Part 1: Specifications). London: British Standard Institution.

- Ref 13.16: British Standards Institution (2024) British Standard ISO 9613-2:2024: Acoustics. Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure level outdoors. London: British Standard Institution.
- Ref 13.17: Department of Transport (1988) Calculation of Road Traffic Noise. Surrey: Her Majesty's Stationary Office.
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- Ref 13.19: National Highways (2020) Design Manual for Roads and Bridges, LA 111 Noise and Vibration. Available at: <https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364> (Accessed: July 2025).
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- Ref 13.25: World Health Organisation (2009) Night Noise Guidelines for Europe. Geneva, Switzerland: World Health Organization.
- Ref 13.26: Department for Environment Food and Rural Affairs (2022). Strategic noise mapping. Available at: <https://www.gov.uk/government/publications/strategic-noise-mapping-2022> (Accessed: July 2025).

14 Socio-economics, Recreation and Tourism

14.1 Introduction

- 14.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Socio-economics, Recreation and Tourism. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 14.1.2 The impacts that will be considered as part of the assessment include:
- Private property: potential impacts from land take and / or changes in access.
 - Community assets: potential impacts from land take, changes in access, and / or amenity (disturbance) effects which could affect use by local residents.
 - Recreation assets: potential impacts from land take, changes in access, and / or amenity (disturbance) effects on areas used for recreational activities.
 - Tourism: potential impacts on the use of tourism accommodation for temporary workforce and the associated visitor response. Potential impacts on tourism businesses from land take, changes in access and / or amenity.
 - Local economy and employment effects: direct, indirect and induced employment generation. Potential impacts on viability of commercial businesses from land take and / or changes in access.
 - Local economic expenditure and supply chain effects.
- 14.1.3 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary socio-economic, recreation and tourism effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 14.1.4 This chapter should be read in conjunction with:
- Chapter 5: Agriculture and Soils, for the potential effects on agricultural businesses.
 - Chapter 6: Air Quality, for the potential effects of pollutants on recreation and tourism sites.

- Chapter 7: Ecology and Biodiversity, for the potential effects on designated and non-designated sites which can be used as touristic and recreational sites.
- Chapter 11: Cultural Heritage for interactions with some heritage assets
- Chapter 12: Landscape and Visual, for the potential landscape and visual effects that can impact socio-economic receptors.
- Chapter 13: Noise and Vibration, for the potential noise and vibration effects that can impact socio-economic, recreational and tourism receptors.
- Chapter 15: Human Health and Wellbeing, for the mental and physical health effects of a loss of access to recreational facilities.
- Chapter 16: Traffic and Transport, for construction traffic routes that can impact socio-economic, recreational and tourism receptors.
- Chapter 19: Major Accidents and Disasters for the potential effect from major accidents and disasters.
- Chapter 20: Coastal Processes due to interactions with fisheries at Easington Landfall.

14.1.5 This chapter is supported by the following figures:

- Volume 3 – Figure 14.1: Socio-economic, Recreation and Tourism Study Area.
- Volume 3 – Figure 14.2: Index of Multiple Deprivation.

14.2 Legislation, Policy and Guidance

Legislation

14.2.1 Legislation relevant to Socio-economics, Recreation and Tourism is detailed in Table 14-1.

Table 14-1 – Summary of Legislation relevant to Socio-economics, Recreation and Tourism

Legislation	How it is considered within this PEIR
National Parks and Access to the Countryside Act 1949	This Act provides detail on the creation, maintenance and improvement of public paths and for securing access to open country. This piece of legislation will inform the land take, access and amenity assessment on recreational assets, assessing the impact on communities who use

Legislation	How it is considered within this PEIR
	PRoW, greenspace / open space and common land for recreational activity.
The Countryside and Rights of Way Act 2000 (CROW Act)	The Act contains measures to improve public access to open countryside and reform and improve rights of way in England and Wales. This piece of legislation will inform the land take, access and amenity assessment on recreational assets, assessing the impact on communities who use public rights of way (PRoW), greenspace / open space and common land for recreational activity.

Policy

National Planning Policy

- 14.2.2 National Planning Policy relevant to Socio-economics, Recreation and Tourism is detailed in Table 14-2.

Table 14-2 – Summary of National Planning Policy relevant to Socio-economics, Recreation and Tourism

Planning Policy Reference	Policy Context	How it is considered within this PEIR
EN-1 (Ref 14.1)		
5.13.3	‘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.’	This assessment will consider the consultation responses contained in the Scoping Opinion and from wider engagement with key stakeholders, details of which are set out in Section 14.3 EIA Scoping Opinion and Engagement.
5.13.4 (part)	‘The applicant’s assessment should consider all relevant socio-economic impacts, which may include: the creation of jobs and training opportunities.’	This assessment will consider whether the Project is likely to generate job and / or training opportunities during construction and decommissioning.
5.13.4 (part)	‘The applicant’s assessment should consider all relevant socio-economic impacts, which may include: any indirect beneficial impacts for the region hosting the infrastructure, in particular in relation to use of local support services and supply chains.’	This assessment will consider the impact of local expenditure arising from the temporary and permanent workforce on the local economy and supply chain during construction and decommissioning.
5.13.4 (part)	‘The applicant’s assessment should consider all relevant socio-economic impacts, which may include: effects (positive and negative) on tourism and other users of the area impacted.’	This assessment will consider the potential impacts on tourism during construction and decommissioning.
5.13.4 (part)	5.13.4 (part) ‘The applicant’s assessment should consider all relevant socio-economic impacts, which may include: the	This assessment will consider the potential impacts of the temporary workforce on local tourism

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure.'	accommodation provision during construction and decommissioning.
5.13.5	'Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies.'	A detailed baseline review will be undertaken as part of this Socio-economics, Recreation and Tourism assessment.
NPPF (Ministry of Housing, Communities and Local Government (Ref 14.2))		
6. Building a strong, competitive economy Paragraph 86	Planning policies should: 'a) set out a clear economic vision and strategy which positively and proactively encourages sustainable economic growth, having regard to the national industrial strategy and any relevant Local Industrial Strategies and other local policies for economic development and regeneration.'	A review of local planning policy is presented in Section 14.2 Legislation, Policy and Guidance.
8. Promoting healthy and safe communities Paragraph 104	'Existing open space, sports and recreational buildings and land, including playing fields and formal play spaces, should not be built on unless: a) an assessment has been undertaken which has clearly shown the open space, buildings or land to be surplus to requirements; or	This assessment will consider the impact of land take, access and amenity on open space, green space and common land used for recreational activity during construction and decommissioning.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	b) the loss resulting from the proposed development would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location; or c) the development is for alternative sports and recreational provision, the benefits of which clearly outweigh the loss of the current or former use.'	
8. Promoting healthy and safe communities Paragraph 105	'Planning policies and decisions should protect and enhance public rights of way and access, including taking opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails.'	This assessment will consider the impact of land take, access and amenity on PRow during construction and decommissioning.

Local Planning Policy

- 14.2.3 Local Planning Policies relevant to Socio-economics, Recreation and Tourism is detailed in Table 14-3.

Table 14-3 – Summary of Local Planning Policy relevant to Socio-economics, Recreation and Tourism

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby District Council Core Strategy Local Plan (2013) (Ref 14.3).	SP13 Economic Growth	'Scale and distribution of economic growth, strategic development management, sustainable economic growth through local employment opportunities or expansion of business in the rural economy and sustainable development which is appropriate and does not harm the character of the area and seeks a good standard of amenity.'	This assessment will consider whether the Project is likely to generate job and / or training opportunities and considers the impact of the Project on community, recreation and tourism assets during construction and decommissioning.
Selby District Council Local Plan Publication Version Consultation 2022 (Ref 14.4).	IC2 Protection of Existing Community Facilities IC3 Protection and Creation of New Open Space, Sport and Recreation Provision IC7 Public Rights of Way	IC2 Development which results in the loss of existing community facilities will only be supported where: A. An assessment has been undertaken which has clearly shown the facility and it's land is surplus to requirements; or B. It is no longer financially viable; or C. The resulting loss would be replaced by equivalent or better provision for the relevant community, in terms of size, quality and accessibility in a suitable location; or D. The redevelopment of the site is for alternative community use, the benefits of which clearly outweigh the loss of the current or former use. IC3 Development which involves the whole or partial loss of open space, sports or recreation facilities will only be supported where: 1. It can be demonstrated that existing open space or recreational facilities are surplus to requirements in line with the most recent evidence base; or 2. A satisfactory replacement facility is provided, and available for use before the existing facility is lost, in a suitable location, accessible to current users, and at least equivalent, or better provision, in terms of its size, function, attractiveness and quality; or 3. Alternative sports and recreational facilities are to be replaced for alternative sports and recreational provision which aligns with the quantitative and qualitative requirements of the latest Green Space Audit where the benefits clearly outweigh the loss of the current provision; or 4. Sports and recreation facilities can best be retained or enhanced through the redevelopment of a smaller part of the site. IC7 Development which may have an impact on a Public Right of Way network will only be supported where it can be demonstrated that: A. Satisfactory and alternative routes are provided, with adequate signage and the new access is of the same or better standard; and	This assessment will consider the potential impact of the Project on community facilities, PRow, open space, sport and recreational assets during construction and decommissioning. Mitigation measures have been proposed where necessary (see Section 14.6 Design Development, Impact Avoidance and Embedded Mitigation).

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		B. Where appropriate and viable, all reasonable opportunities for enhancement have been taken up.	
East Riding Local Plan 2012-2029 Strategy Document (Ref 14.5).	C2 Supporting community services and facilities C3 Providing public open space for leisure and recreation	C2 To maintain and improve access to a range of services and facilities in the East Riding, which meet the needs of residents and in appropriate circumstances visitors. C3 Proposals should maintain and / or enhance the quantity, quality and accessibility of open space and address any shortfalls in provision.	This assessment will consider the potential impact of the Project on community facilities and open space. Mitigation measures have been proposed where necessary (see Section 14.6 Design Development, Impact Avoidance and Embedded Mitigation).
North Lincolnshire Local Development Framework Core Strategy (Ref 14.6).	CS23: Sport, Recreation and Open Space	Development proposals that will result in the loss of an existing leisure, recreation facility, natural green space, open space or playing pitches will not be supported unless: 1. There is currently an excess of provision; or 2. Satisfactory alternative provision equivalent or better quality and quantity in a suitable location is made; or 3. The facility is no longer needed	This assessment will consider the potential impact on sport, recreation and open space. Mitigation measures have been proposed where necessary (see Section 14.6 Design Development, Impact Avoidance and Embedded Mitigation).
North East Lincolnshire Local Plan 2013 to 2032 (Ref 14.7)	SO3 Economy	‘Support local economic growth by promoting conditions that support an increase in the number of better paid jobs, removing barriers to investment and access to jobs and improving skills. Promote rural regeneration and diversification, including a stronger tourism offer.’	This assessment will consider whether the Project is likely to generate jobs and / or training opportunities during construction and decommissioning. The assessment will consider the impact of the Project on tourist attractions and accommodation during construction and decommissioning.
Central Lincolnshire Local Plan adopted (Ref 14.8).	S50 Community Facilities S51 Creation of New Open Space, Sports and Leisure Facilities	S50 The loss, via redevelopment, of an existing community facility to provide an alternative land use which is not that of a community facility will only be permitted if it is demonstrated that: a) The facility is demonstrably no longer fit for purpose, and the site is not viable to be redeveloped for a new community facility; or b) The service provided by the facility is met by alternative provision that exists within reasonable proximity: what is deemed as reasonable proximity will depend on the nature of the facility and its associated catchment area; or c) The proposal includes the provision of a new community facility of similar nature and of a similar or greater size in a suitable on or offsite location S51 The Central Lincolnshire Authorities will seek to ensure new development provides an appropriate amount of new open space, sports and leisure facilities to meet need.	This assessment will consider the potential impact of the Project on community facilities, open space, sports and leisure facilities. Mitigation measures have been proposed where necessary (see Section 14.6 Design Development, Impact Avoidance and Embedded Mitigation).

Guidance

- 14.2.4 The Socio-economics, Recreation and Tourism assessment has been carried out in accordance with the 'Additionality Guide Fourth Edition' (Ref 14.9) which sets out the economic principle of additionality for job creation. The assessment has also given consideration to the guidance presented in the Design Manual for Roads and Bridges (DMRB) LA112 Population and Human Health for land use assessment (Ref 14.10).

14.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 14.3.1 A summary of points of relevance to the Socio-economics, Recreation and Tourism assessment contained within the EIA Scoping Opinion, together with our responses, are outlined in Table 14-4

Table 14-4 – Summary of Scoping Opinion relevant to Socio-economics, Recreation and Tourism

Section Reference	Matter	Comments	Response
ID 2.1.5	Employment	The ES should set out the expected number and nature of employment opportunities during each phase of the proposed development. This should be described in the context of the workforce availability in the area at a time. The ES should detail how any mismatch between supply and demand would be addressed and consider the origins of its workforce in all relevant aspect assessments (notably socio-economics and traffic and transport). All assumptions made in this regard should be set out in the ES.	Construction worker numbers across the construction phase as well as peak construction numbers have been used for the construction employment assessment. This will be updated in the ES if refined data is available. The impact of job creation will be assessed in the context of the existing local labour force using the method outlined in Section 14.4 Assessment Methodology. During operation the Pump Facility would be operated by an anticipated maximum of four on-site staff during routine operations. Therefore, no significant effects are expected on the local labour market from employment generation and operational employment has been scoped out.
ID 3.9.6	Significance of effect	Paragraph 13.3.4 of the Scoping Report states that significance would be derived using the matrix set out in Table 4-1. However, the sensitivity and magnitude criterion used in Table 13-3 and paragraph 13.3.3 respectively do not accord with those presented in Table 4-1. The applicant should ensure consistency in its approach or provide clear explanations where aspect specific approaches depart from the overarching methodology.	The socio-economic terminology for sensitivity and magnitude will be amended to match the terminology used in Chapter 4: EIA Methodology.
ID 3.9.7	Construction phase effects	Paragraph 13.10.1 of the Scoping Report considers the impacts of expenditure on local services / economy under the headings of both tourism and local economic expenditure. The applicant should ensure that potential impacts are not double counted within the ES.	Expenditure associated with temporary construction workers will be considered in the ES within the context of the local economy and supply chain assessment.
ID 3.9.8	CLdN Ports Killingholme	The applicant's attention is drawn to the comments of CLdN Ports Killingholme Ltd regarding the location of the proposed construction traffic corridor and construction compound. The ES should assess any likely significant effects resulting from impacts on the port, including from loss of trade and employment.	CLdN Ports Killingholme is located within the local Study Area for the Socio-economics, Recreation and Tourism assessment and therefore potential impacts on this receptor will be included in the assessment.
Scoping response from Natural England	Connecting people with nature	The ES should consider potential impacts on access land, common land, public rights of way and, where appropriate, the England Coast Path and coastal access routes and coastal margin in the vicinity of the development, in line with NPPF paragraph 100 and there will be reference in the relevant National Policy Statement. It should assess the scope to mitigate for any adverse impacts. Rights of Way Improvement Plans (ROWIP) can be used to identify public rights of way within or adjacent to the proposed site that should be maintained or enhanced. Measures to help people to better access the countryside for quiet enjoyment and opportunities to connect with nature should be considered. Such measures could include reinstating existing footpaths or the creation of new footpaths, cycleways, and bridleways.	The assessment to be reported in the ES will consider all likely significant effects on local and national cycle and walking routes, including PRow within the local Study Area. Temporary measures would be put in place, such as diversions, to accommodate the continued use of these routes ensuring access to the countryside and areas of open space are maintained (see Section 14.6 Design Development, Impact Avoidance and Embedded Mitigation). The assessment to be reported in the ES will consider relevant information from the Ecology and Landscape and Visual assessments in relation to green infrastructure.

Section Reference	Matter	Comments	Response
		Links to other green networks and, where appropriate, urban fringe areas should also be explored to help promote the creation of wider green infrastructure. Access to nature within the development site should also be considered, including the role that natural links have in connecting habitats and providing potential pathways for movements of species.	
Drax Power Limited	Drax Power Station	The EIA should fully consider the existing operations of the Drax Power Station as part of the baseline, as well as any impact from the HCC Pipeline project on the continuing operation of the Drax Power Station.	Drax Power Station is located within the local Study Area for the Socio-economics, Recreation and Tourism assessment and potential impacts on this receptor will therefore be included in the assessment to be reported in the ES.
Marine Management Organisation (MMO)	MMO	The MMO asks the applicant to produce a separate chapter per environmental topic, this includes commercial fisheries.	Potential impacts on commercial fisheries have been captured within this chapter. A high-level overview and assessment has been provided in the PEIR where relevant, with cross reference given to the Offshore Environmental Statement (Ref 14.11).

Summary of Engagement

- 14.3.2 Broader engagement with key stakeholders including local authorities (North Lincolnshire, North Yorkshire, North East Lincolnshire and East Riding of Yorkshire) has been carried out as part of the overall consultation programme to inform the PEIR. Regular engagement with local authorities has been led by the Stakeholder Engagement team. Feedback received from engagement, specifically relating to the Socio-economics, Recreation and Tourism assessment, has predominantly focused on concerns regarding potential disruption to local communities due to increased traffic during the construction phase. These impacts have been assessed in Chapter 16: Traffic and Transport, and relevant findings have been summarised where they may affect the amenity of community and recreational assets.

14.4 Assessment Methodology

Baseline Data

Study Area

- 14.4.1 Defining the spatial scope for a Socio-economics, Recreation and Tourism assessment can be complex given the wide range of receptors and the different ways they might be affected. In the absence of a standard methodology, the Study Area for the Socio-economics, Recreation and Tourism assessment has been defined using professional judgement and best practice from similar linear projects, together with guidance relating to study areas taken from DMRB LA112 Population and Human Health (Ref 14.10). The spatial scope comprises two Study Areas which are intended to capture the range of socio-economic effects that may occur during construction, operation and decommissioning.
- 14.4.2 The local Study Area is a 500 m buffer around the draft Order Limits which is considered sufficient to capture potential impacts on land take, access and amenity. Amenity effects arise from a combination of traffic, visual, air quality and noise effects. These effects are considered in combination to determine the potential overall adverse effect on residents, commuters and visitors within the local Study Area.
- 14.4.3 Potential effects on the local economy, local labour force and supply chain are assessed within a wider Study Area which will comprise Yorkshire and the Humber region. The Study Areas are shown on Figure 14.1 Socio-economic, Recreation and Tourism Study Area.

Baseline Data Collection

Desk Study Sources

- 14.4.4 Baseline conditions have been established using the following data sources:
- Population: demographic data for both local and wider study areas, including age profile and population change. Datasets include Census 2021 data from the Office for National Statistics (Ref 14.12). Deprivation data has been sourced from the Indices of Multiple Deprivation 2019 (Ref 14.13).
 - Local economy and employment: economic activity and inactivity, unemployment rates and employment by sector are taken from Census 2021 data (Ref 14.12).
 - Community and recreation infrastructure (e.g. schools, healthcare facilities, areas of open space, PRoW): assets have been identified using local authority evidence base studies including documents outlined in Table 14-3, land registry data and open space assessments together with aerial mapping and imagery.
 - Tourism: information on relevant tourism assets has been collected from local authority evidence base studies and tourism strategies where available, as well as available data relating to the volume and value of tourism from websites such as Visit Britain (Ref 14.14) and Visit North Yorkshire (Ref 14.15).

Site Visits and Surveys

- 14.4.5 No specific site visits or surveys have been undertaken as part of the Socio-economics, Recreation and Tourism assessment. However, certain aspects of the baseline e.g. access to Easington beach, were verified by members of the Project team visiting the area as part of the wider EIA site survey programme.

Impact Assessment Methodology

- 14.4.6 The Socio-economics, Recreation and Tourism assessment uses a range of appropriate guidance and methodologies to identify and assess relevant changes that may arise from the Project.
- 14.4.7 Direct employment generated during the construction phase is estimated by using the estimated total construction worker / peak number of construction workers required for the Project. Following the estimate of direct employment, an assessment of indirect employment is made using guidance set out in the 'Additionality Guide Fourth Edition' (Ref 14.9). Indirect employment includes an

estimate of 'deadweight' (i.e. what would happen in the absence of the Project), 'leakage' (employment accessed by workers from outside the wider Study Area), 'displacement' (reduction of employment elsewhere as a result of the Project and firms directly affected by the Project in terms of having to relocate or being disrupted by the construction process) and multiplier effects (increased employment in supply chains and as a result of local spend by new employees).

- 14.4.8 This section outlines the sensitivity, magnitude and significance criteria that are applied to the various receptors.

Sensitivity

- 14.4.9 There is no published guidance or specific requirement for applying sensitivity to socio-economic receptors and therefore a bespoke approach is applied that assigns sensitivity based on vulnerability to change and socio-economic context, using professional judgement where required. The sensitivity of receptors will be assessed using the approach set out in Table 14-5.

Table 14-5 – Approach to Determining Sensitivity

Sensitivity	Description
High	The receptor has little ability to absorb change without fundamentally altering its present character, is of high environmental value, or is of international or national importance. In a socio-economic context this may relate for example to a shortfall or constrained supply of appropriate labour or skills when compared to the regional and national averages, or to areas of low educational attainment. For community assets this may relate to facilities that are in regular (daily) use by members of the community. For PRow, high sensitivity would be applied to national trails or routes likely to be used for both commuting and recreation that record frequent (daily) use and typically connect communities with employment land uses and other services. Little / no potential for substitution.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance. In a socio-economic context, this may relate to skills and capacity shortages, for example. For community assets this may relate

Sensitivity	Description
	to facilities that are in weekly use by members of the community. For PRoW this may relate to regional trails and routes (e.g. promoted circular walks) likely to be used for recreation and to a lesser extent commuting, that record frequent (daily) use. Limited potential for substitution.
Low	The receptor is tolerant of change without detriment to its character, is of low environmental value or is of low or local importance. In a socio-economic context, this may relate to a limited supply of labour and skills, for example. For community assets this may relate to infrequent use. For PRoW this may relate to routes close to communities which are used for informal recreational purposes (e.g. dog walking), but for which alternative routes can be taken.
Very Low (Negligible)	The receptor has capacity for change or is of little environmental value. In a socio-economic context, this may relate to the area having a readily available workforce, or no skills shortages. For community assets this may relate to facilities that are rarely used. For PRoW, these may be routes which have fallen into disuse through past severance, or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes.

Magnitude

14.4.10 The impact magnitude represents the scale or extent of a change from baseline conditions. Given the variety of the socio-economic considerations, it is not appropriate to create definitive magnitude criteria for each assessment area, rather the effects are based on setting the change in the context of the baseline and using professional judgement as required. Impact magnitude will be assessed by giving consideration to the following factors where relevant:

- The geographic extent of the impact.
- The duration and reversibility of the impact.
- The capacity of the receptor to absorb or adjust to the impact.

14.4.11 Impact magnitude is described as very low (negligible), low, medium or high.

Significance

- 14.4.12 Chapter 4: EIA Methodology outlines how the significance of effect will be assessed by considering the sensitivity of a receptor and the magnitude of the impact. Significance of effect can be considered beneficial (positive), adverse (negative) or neutral. Significance of effect will be rated on a scale of Neutral, Minor, Moderate or Major. For the purpose of this assessment, major and moderate effects are considered to be 'significant.'

Assumptions and Limitations

- 14.4.13 The Socio-economics, Recreation and Tourism assessment assumes that the potential impacts expected during the decommissioning phase are likely, given the future baseline (Section 14.5 Baseline Conditions), to be similar in nature to those expected during the construction phase.
- 14.4.14 Given the scale of the North Yorkshire Unitary Authority compared to the area potentially impacted by the Project, baseline data has been collected for the Selby District only, in addition to East Riding of Yorkshire, North Lincolnshire and North East Lincolnshire Unitary Authorities.
- 14.4.15 The employment assessment has been based on the estimated total construction worker and peak construction worker numbers.
- 14.4.16 Permanent land take is assumed to be a construction effect as this is the point at which the land take impact occurs. Although the land take effects continue through to the operational phase of the Project, they are assessed as a construction effect as this is the point at which it occurs.
- 14.4.17 No surveys have been undertaken to date. A site visit to ground truth baseline receptors along the Project would be limited given the scale and location of the route, however receptors have been verified where possible. The Traffic and Transport team are engaging with PRow officers to understand if a PRow survey is required before the ES.

14.5 Baseline Conditions

Existing Baseline

- 14.5.1 This section provides a review of the existing social and economic conditions across the areas affected by the Project. The Project extends across four Local Authorities (LAs): Selby (North Yorkshire), East Riding of Yorkshire, North

Lincolnshire and North East Lincolnshire. For the most part, baseline conditions are presented at local authority level, using regional level (Yorkshire and the Humber) data for comparison where appropriate.

Overview

- 14.5.2 The Project extends across a mostly rural area, extending between Drax in North Yorkshire and the coast north of Easington in the East Riding of Yorkshire. Towns that the Project passes close to include Goole, Winterton, Barton-upon-Humber and Immingham and Withernsea. There are no residential properties within the draft Order Limits.
- 14.5.3 Table 14-6 shows population data across the local authorities by age group. Overall, the LAs have an older population on average, with a higher proportion in the 65 and over category compared to Yorkshire and the Humber region as a whole.

Table 14-6 – Population by Age Band (Ref 14.16)

LA / Age Band	Aged 4 - 15 yrs	Aged 16- 24 yrs	Aged 25- 49 yrs	Aged 50- 64 yrs	Aged 65+ yrs
Selby	18.0%	8.3%	31.1%	22.2%	20.4%
The East Riding of Yorkshire	15.8%	8.1%	27.0%	22.7%	26.4%
North Lincolnshire	17.8%	8.9%	29.6%	21.8%	22.0%
North-East Lincolnshire	18.8%	9.2%	30.0%	21.1%	20.9%
Average LA	17.6%	8.6%	29.4%	22.0%	22.4%
Yorkshire and the Humber	18.6%	11.1%	31.6%	19.7%	19.0%

Deprivation

- 14.5.4 The Index of Multiple Deprivation (IMD) provides relative measures of deprivation across England, and across seven domains of deprivation (income, employment, education, skills and training, health and disability, crime, barriers to housing and services and living environment) (Ref 14.12). The domains are combined using weightings (based on academic literature and robustness of indicators). IMD data is presented at Lower Layer Super Output Area (LSOA)

level¹³. Across the wards that intersect the local Study Area there are 86 LSOAs, as shown on Figure 14-2 Index of Multiple Deprivation (Ref 14.12).

14.5.5 For each deprivation domain, the LSOA with a rank of 1 is the 'most' deprived and the LSOA with the rank of 32,844 (total LSOAs in England) is the 'least' deprived. Deciles are calculated by ranking the 32,844 neighbourhoods (LSOAs) in England from most deprived to least deprived and dividing them into ten equal groups. For example, LSOAs in decile 1 fall within the 'most' deprived 10% of all LSOAs.

14.5.6 As Figure 14-2 shows, across the local Study Area, six LSOAs are considered in the most deprived 10% overall for deprivation (all domains considered together). These LSOAs are within the town of Withernsea and Immingham at the east end of the Project.

Community Infrastructure

14.5.7 Community infrastructure encompasses a wide range of facilities, services and systems that support society such as schools, healthcare services, community centres, libraries, places of worship, care homes and emergency services. Table 14-7 lists community receptors within the local Study Area, none of which are located within the draft Order Limits.

Table 14-7 – Community Receptors within the local Study Area

Local Authority	Name	Description
Selby	Kids' Corner Pre-School	Pre-School
Selby	Kids' Corner Nursery	Nursery
Selby	Drax Flowerpots Playgroup	Playgroup
East Riding of Yorkshire	St Helen's Church: Barmby-on-the-Marsh / Cemetery	Place of Worship
East Riding of Yorkshire	Barmby on the Marsh Methodist Chapel	Place of Worship
East Riding of Yorkshire	Barmby on the Marsh Primary School	Primary School
East Riding of Yorkshire	Kingdom Hall of Jehovah's Witnesses	Place of Worship

¹³ LSOAs are a standard statistical geography and were produced by the ONS for the reporting of small area statistics.

Local Authority	Name	Description
East Riding of Yorkshire	Cathedral International Campus Goole	Place of Worship
East Riding of Yorkshire	Moorlands Youth and Community Centre	Community Centre
East Riding of Yorkshire	Goole Hall Residential Care Home	Residential Care Home
East Riding of Yorkshire	Ashtree boarding and Rehabilitation centre	Rehabilitation Facility
East Riding of Yorkshire	Bleak House	Assisted Living Residence
East Riding of Yorkshire	Garden House	Assisted Living Residence
East Riding of Yorkshire	Rawcliffe Bridge Post Office	Post Office
East Riding of Yorkshire	Rawcliffe Cemetery	Cemetery
East Riding of Yorkshire	Kids Planet Turnbridge	Nursery
East Riding of Yorkshire	East Cowick Village Hall	Village hall
East Riding of Yorkshire	Cowick Church of England Primary School	Primary School
East Riding of Yorkshire	Rawcliffe Bridge Primary School	Primary School
East Riding of Yorkshire	Swinefleet Primary School	Primary School
East Riding of Yorkshire	Paull Village Hall	Village hall
East Riding of Yorkshire	Paull Primary School	Primary School
East Riding of Yorkshire	Paull Methodist Chapel	Place of Worship
East Riding of Yorkshire	Thorngumbald Primary School	Primary School
East Riding of Yorkshire	St Germain's Church: Winstead	Place of Worship
East Riding of Yorkshire	St Patrick's Church	Place of Worship
East Riding of Yorkshire	Patrington Primary Academy	Primary School
East Riding of Yorkshire	Patrington Cemetery	Cemetery
North Lincolnshire	West Halton & Coleby	Village Hall
North Lincolnshire	South Ferriby Primary School	Primary School

Local Authority	Name	Description
North Lincolnshire	Precision	Job Centre
North Lincolnshire	Barrow Upon Humber Cemetery	Cemetery
North Lincolnshire	Thornton Abbey Train Station	Train Station
North Lincolnshire	All Saints Church Adlingfleet	Place of Worship
North Lincolnshire	St Peter, East Halton	Place of Worship
North East Lincolnshire	East Halton Primary School	Primary School
North Lincolnshire	St Etheldreda's Church / Cemetery	Place of Worship
North Lincolnshire	St Denys' Church, North Killingholme	Place of Worship
North Lincolnshire	Church Of St John The Evangelist: Croxton	Place of Worship
North Lincolnshire	St Maurice's Church: Horkstow	Place of Worship
North Lincolnshire	South Killingholme Community Centre	Community Centre
North Lincolnshire	The Killingholme Surgery	GP
North Lincolnshire	Killingholme Border Control Post	Post Office
North East Lincolnshire	St Margaret's Church, Immingham	Place of Worship
North East Lincolnshire	St Peter, Immingham	Place of Worship
North East Lincolnshire	Habrough Village Hall	Village hall
North East Lincolnshire	Immingham parish Cemetery	Cemetery

Local Economy and Employment

- 14.5.8 Yorkshire and the Humber has approximately 3.4 million people aged between 16 and 64 (i.e. of working age). Of these, 2.8 million (82.4%) are economically active. The population described as economically inactive includes students and those who are retired (Ref 14.13).
- 14.5.9 Table 14-8 shows the proportion of employed, unemployed, claimant count (claiming unemployment benefits primarily Jobseeker Allowance and Universal Credit) and retired people across the LAs in 2021. The table shows that the East Riding of Yorkshire has a higher proportion of retired people compared to

the other local authorities in the wider Study Area, which is in line with it also having the largest proportion of people aged over 65 (Table 14-6). Claimants as a proportion of economically active residents aged 16 and over for Yorkshire and the Humber is 5.6%, greater than the local authority average (4%) (Ref 14.17).

Table 14-8 – Economic Activity (Ref 14.18)

LA / Economic Status	Employed (excluding students)	Unemployed	Retired	Claimant Count
Selby	61.9%	1.9	25.3%	2.7%
The East Riding of Yorkshire	54.9%	2.0%	31.0%	2.9%
North Lincolnshire	55.9%	2.6%	27.0%	4.8%
North-East Lincolnshire	55.4%	2.8%	24.9%	5.4%
Average LA	57.0%	2.3%	27.1%	4%
Yorkshire and the Humber	56.2%	2.7%	22%	5.6%

- 14.5.10 Across Yorkshire and the Humber, 6.5% of the workforce jobs are in the construction sector (184,000), which is higher than the UK average (6.1%) (Ref 14.19). Another 13.3% of the region are employed in wholesale and retail trade, with the largest proportion working in human health and social work activities (14.4%) (Ref 14.19). All regions in the UK require growth in their construction sector employment in order to meet future needs; Yorkshire and the Humber would need to increase current recruitment in the sector by 5,320 new workers each year to deliver the projected work between 2024 and 2028 (Ref 14.20).
- 14.5.11 In 2021 household disposable income for Yorkshire and the Humber was on average £18,363, almost £9,000 less than the national average. Gross Value Added (GVA) provides an indication of the goods and services produced per hour worked and is used as a rough measure of labour productivity of a region. For Yorkshire and the Humber, GVA was £36.8 in 2023, lower than the England average of £42.4 (Ref 14.21).

14.5.12 The draft Order Limits have been selected to avoid built up areas where possible. The following commercial businesses are found within the draft Order Limits:

- Port at Killingholme (Marine Energy Park, GB Terminals and ABLE Humber Ports Facility).
- Brenton Brother Transport.
- Milence Charging Station (Electric Vehicle charging station).
- Salt End Chemicals Park (BP Chemicals & Mitsubishi Chemical).
- Discount Tyre & Service Centre (FASCO Buildings Limited).

Commercial Fisheries

14.5.13 Impacts on commercial fisheries in relation to the Project are expected to be minimal given Project scope and location. However, it is acknowledged there is potential for commercially important species to be impacted as a result of the Project (see Chapter 7: Ecology and Biodiversity), and therefore a high-level overview of baseline conditions is provided here. For a full outline of commercial fisheries activity in the offshore / marine area please refer to the Offshore Environmental Statement (Ref 14.11).

14.5.14 The Project overlaps with International Council for the Exploration of the Seas (ICES) Statistic Rectangles 36E9 at the Humber and River Trent and 36F0 at Easington Landfall and the Humber mouth; landing Ports are noted as Grimsby, Bridlington, Hornsea, Hartlepool, Whitby, Scarborough, Flamborough and Skegness. These areas are used to inform statistical analysis of sea areas (ICES statistical rectangles (Ref 14.22)).

14.5.15 The following fishing activities may take place, albeit in relatively low intensities (Ref 14.23):

- Bottom trawl and bottom seines within the Humber, low intensity.
- Pelagic trawls in the nearshore (approximately 4 km offshore), low intensity.
- Static gear at Easington Landfall and within the Humber, low intensity.
- Beam trawl at the Humber mouth, low intensity.

14.5.16 During 2023, pots and traps (static gear) were the dominant fishing method in the relevant ICES rectangles, albeit fishing intensity is still low in comparison to offshore waters. Fishing pressure for other fishing methods increases beyond 12 nm of the coastline. Total landings during 2023 into ICES Rectangle 36E9 and 36F0 were 105.33 tonnes and 2989.95 tonnes respectively; this concluded a total value of £1,004,199.11 and £13,248,704.67 respectively (Ref 14.24).

14.5.17 The primary landed species at local Ports include shellfish, alongside some demersal species (see Chapter 7: Ecology and Biodiversity). Specifically, crabs, lobsters, and scallops are among the most common landings, alongside species such as European plaice (*Pleuronectes platessa*), turbot (*Scophthalmus maximus*), sole (*Solea solea*) and brill (*Scophthalmus rhombus*) (Ref 14.11).

14.5.18 The nearest designated shellfish waters site is the West Wash (ID 4) (Ref 14.25). A bivalve classification area coincides with the West Wash Shellfish Protected Area, designated for mussel and cockle species (Ref 14.26).

Recreation

14.5.19 Two National Cycle Routes (NCR) are within the local Study Area. NCR 1, a route from Dover to the north of Scotland, is intersected by the Project south of Barton-upon-Humber (Ref 14.27). NCR 65 extends from Hornsea to Middlesbrough and forms part of the Trans Pennine Trail (TPT) cycle route between Selby and Hornsea (Ref 14.28). It lies within the local Study Area at the west end of the Project at Barmby on the Marsh.

14.5.20 Table 14-9 lists other long distance walking routes around the local Study Area. All pass through the draft Order Limits with the exception of Towers Way. These routes, although not nationally significant, are still used for recreational activity.

Table 14-9 – Long Distance Walking Routes (LDWR) (Ref 14.28)

Route	Distance (from start to end)	Local Authorities	PRoW within LDWR (Route code)
TPT	212 miles	East Riding of Yorkshire	Barmby on the Marsh Footpath 3 (BOTMF03)
Trent Valley Way	108 miles	North Lincolnshire	Bridleway ALKB7 (46111580)
Viking Way	146 miles	North Lincolnshire	Bridleway SFER1 (46102285)
Nev Cole Way	57 miles	North Lincolnshire	Bridleway ALKB7 (46111580), Footpath GOXH50 (46111373), footpaths (46111123,

Route	Distance (from start to end)	Local Authorities	PRoW within LDWR (Route code)
			46111237, 46111460, 46111246),
Towers Way	15 miles	North Lincolnshire	Footpaths (46111060, 46111207, 46111237, 46111460, 46111246), Unclassified (8)
East Hatton Skitter Trail	5 miles	North Lincolnshire	Footpath GOXH50 (46111373)
Greenwich Meridian Trail	273 miles	East Riding of Yorkshire, North East Lincolnshire	Welwick Bridleway No.2 (45912830)
Three Ridings on Foot	439 miles	East Riding of Yorkshire, North Lincolnshire	No

- 14.5.21 The King Charles III England Coast Path connects communities around the English coast. It is currently being expanded and upgraded in stretches. The stretch of route within the East Riding of Yorkshire and North Lincolnshire is not yet open. As of March 2025, sections of the route that run along the coast, past Withernsea and along the edges of the Humber (which fall within the local Study Area for the Project), are either approved in whole or in part but not yet open and accessible. Establishment works are planned or in progress for approved lengths (Ref 14.29).
- 14.5.22 There are approximately 212 PRoW within the local Study Area, of which 72 PRoW (51 footpaths, 16 bridleways, one bridle road and four unclassified) lie within the draft Order Limits.
- 14.5.23 Other recreational assets within the local Study Area are presented in Table 14-10. None of these facilities are within the draft Order Limits.

Table 14-10 – Recreation Receptors within local Study Area

Local Authority	Name	Description
East Riding of Yorkshire	South Pasture Stables	Equestrian Facility
East Riding of Yorkshire	Sandalwood Campsite	Campsite
East Riding of Yorkshire	Percy Park	Public Open Space / Urban Park
East Riding of Yorkshire	Paull Playground	Play park
East Riding of Yorkshire	Thorngumbald Playing Fields	Playing fields
East Riding of Yorkshire	Patrington Playing Field	Playing fields
East Riding of Yorkshire	Patrington Haven Leisure Park & Equestrian Centre	Equestrian Facility
East Riding of Yorkshire	Goole Marina	Marina
North Lincolnshire	Premier Equine International Ltd.	Equestrian Facility
North Lincolnshire	Thorpe Meadows	Equestrian Facility
North Lincolnshire	Wootton Park	Park & Garden

- 14.5.24 Easington beach is located at the east end of the Project, within the local Study Area and draft Order Limits. The beach is a remote stretch of sand / mixed pebbles and is a popular spot for walkers and is dog friendly. The beach can be accessed at the south-east of Easington, at the end of Seaside Road. There is informal parking and a short, sloped path to access the beach itself.

Tourism

- 14.5.25 In 2023, Yorkshire and the Humber recorded 1.1 million international visits, a 14% drop from 2019, although visitor spending rose slightly to £644 million (Ref 14.30).

14.5.26 North Yorkshire's visitor economy was worth £4.2 billion in 2024, up 3.9% on 2023 (Ref 14.31), with over 31 million people visiting with an average length of stay of four days. Just over 38,000 people are employed in the tourism industry in North Yorkshire, a 5.2% increase from 2023. In 2019, the visitor economy in Selby District contributed £187.4 million and supported 4,392 jobs—equating to 12.2% of the district's working population (Ref 14.32).

14.5.27 Table 14-11 outlines key statistics relating to serviced and non-serviced accommodation within the Local Authorities. The last available Census of Accommodation Stock survey was carried out in 2016 (Ref 14.33).

Table 14-11 – Accommodation Stock Audit (Rooms) (Ref 14.33)

Local Authority	Serviced Accommodation rooms (Hotels, B&Bs etc)	Non-serviced rooms (holiday lets, campsites etc)	Total serviced and non-serviced rooms
Selby	463	140	603
East Riding of Yorkshire	4,644	3,228	7,872
North Lincolnshire	565	505	1,070
North-East Lincolnshire	1,076	547	1,623
LA Total	6,748	4,420	11,168

14.5.28 Occupancy in the Yorkshire and Humber region was 79% in 2023, an increase of 5% from 2021 (Ref 14.34). If this occupancy rate is applied to the total serviced and non-serviced rooms across the four local authorities shown in Table 14-11, it would equate to approximately 2,346 available rooms (21% of the total).

14.5.29 Table 14-12 lists tourism accommodation located within the local Study Area.

Table 14-12 – Tourism Accommodation within the Local Study Area

Local Authority	Name	Description
Selby	Mansion House	Hotel
Selby	Laurels Park Campsite	Campsite

Local Authority	Name	Description
East Riding of Yorkshire	The Farmhouse Bed and Breakfast	B&B
East Riding of Yorkshire	The Bay Horse Rooms	Hotel
East Riding of Yorkshire	The Pig Inn & The Peppered Pig	Hotel
East Riding of Yorkshire	Turnbridge Lodge	Guest House
East Riding of Yorkshire	Paull Holme B&B	B&B
East Riding of Yorkshire	Fairview Luxury Lodge	Lodge
East Riding of Yorkshire	Rysome Garth Farmhouse	Guest House
North Lincolnshire	Ashbourne Hotel	Hotel
North Lincolnshire	West Wold Farm House	B&B
North Lincolnshire	Walcot Hall	Hotel
North Lincolnshire	Butterswood Lodge	Hotel
North Lincolnshire	Villa Farm Cottage	Hotel
North Lincolnshire	East Halton Hotel	Hotel
North Lincolnshire	Black Bull Inn	Hotel
North Lincolnshire	Sycamore Cottage Caravan & Camping C&CC Certificated Site	Campsite
North Lincolnshire	Brookside Country Park	Caravan Site
North East Lincolnshire	The Old Vicarage B&B	B&B
North East Lincolnshire	Church Farm Guest House	Guest House

Tourist Attractions

- 14.5.30 Table 14-13 lists all tourism attractions within the local Study Area. No tourism attractions are within the draft Order Limits.

Table 14-13 – Tourism Attractions within the Local Study Area

Local Authority	Name	Description
East Riding of Yorkshire	Goole Museum	Museum
East Riding of Yorkshire	Paull Holme Tower	Historic Landmark
East Riding of Yorkshire	Paull Lighthouse	Historic Landmark & Viewpoint
East Riding of Yorkshire	Thorngumbald Clough High Lighthouse	Historic Landmark
East Riding of Yorkshire	Thorngumbald Clough Low Lighthouse	Historic Landmark
North Lincolnshire	Thorton Abbey and Gatehouse	Historic Monastery

- 14.5.31 Within the wider region, Yorkshire and the Humber is the location of Cannon Hall Museum which is in the top 20 most visited free attractions in the UK, with 983,000 visitors in 2023 (Ref 14.35). It is also the location of the Yorkshire Wildlife Park which is in the top 20 most visited paid attractions in the UK with 921,000 visitors in 2023 (Ref 14.35).

Future Baseline

Projected Population

- 14.5.32 Table 14-14 presents ONS population projections for the next ten years to 2034 and the 20 years to 2043. Percentage changes are shown between 2024 and 2034, and 2024 and 2043 respectively.

Table 14-14 – Population Projections (Ref 14.36)

LA	2024	2034	% Change 2024-2034	2043	% Change 2034-2043
Selby	94,687	100,825	+6.48	104,931	+4.07
East Riding of Yorkshire	347,327	355,050	+2.22	360,082	+1.41
North Lincolnshire	174,881	176,655	+1.01	178,336	+0.95
North-East Lincolnshire	159,951	158,827	-0.70	158,816	0.0
Yorkshire and the Humber	5,605,798	5,764,449	+2.83	5,890,408	+2.19

- 14.5.33 Table 14-15 presents the projected population by age group across the next 20 years. The 16 to 24 age group is the only one expected to see an increase to 2034 and then a decline, supporting the evidence of an ageing population with a smaller number of working age population to support.

Table 14-15 – Population Projection by Age Band for the Region (Ref 14.37)

Yorkshire and The Humber	All ages	Aged 16-24	Aged 25- 49	Aged 50- 64	Aged 65+
2024	5,606,000	629,000	1,728,000	1,088,000	1,114,000
2034	5,765,000	700,000	1,753,000	994,000	1,326,000
2043	5,890,000	644,000	1,773,000	1,047,000	1,396,000

14.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 14.6.1 The Project location has been specifically chosen to avoid socio-economic receptors such as social infrastructure, businesses, recreation and tourism assets, where possible as part of the design development and siting process,

and largely passes through agricultural land. Consideration of alternative routes is outlined in Chapter 3: Consideration of Alternatives.

Embedded Mitigation

- 14.6.2 The Construction Environmental Management Plan (CEMP) (Volume 4 – Appendix 4.1: Draft Construction Environmental Management Plan) sets out a series of measures, based on best practice guidance from a range of environmental disciplines to control the environmental effects of the construction of the Project.
- 14.6.3 Embedded mitigation measures are presented in Table 14-16

Table 14-16 – Embedded Mitigation

Ref	Measure	Project phase	Responsible Party
SEC1	Ensuring contractors act considerably in relation to local residents	Construction and decommissioning	Contractor
SEC2	Appropriate fencing, signage and safety precautions	Construction and decommissioning	Contractor
SEC3	Construction compounds would be located to avoid or minimise environmental and community impacts, provide the best access for personnel and deliveries in relation to major structures and worksites, and meet other construction requirements for the Project.	Construction and decommissioning	Contractor
SEC4	Where PRoW or cycle routes may be disrupted by construction of the Project, temporary diversions will be put in place together with appropriate signage as necessary. If this is not possible, discussions will occur with stakeholders to agree the most appropriate approach.	Construction and decommissioning	Contractor
SEC5	Pipeline to be adequately buried below the predicted cliff line and seabed profile throughout its design life (25 years).	Construction and operation	Designer
SEC6	Following pipeline installation, the beach will be reinstated to pre-construction condition.	Construction	Contractor
SEC7	The cofferdam and other associated infrastructure will be present for as short a time as reasonably practicable during construction.	Construction	Contractor

Ref	Measure	Project phase	Responsible Party
SEC8	Production of a Decommissioning Environmental Management Plan (DEMP) to identify and mitigate the potential impacts of decommissioning activities.	Decommissioning	Contractor

14.7 Preliminary Assessment of Potential Impacts

- 14.7.1 This section details the preliminary assessment of potential impacts during construction, operation and decommissioning phases.

Construction

- 14.7.2 The potential impacts for Socio-economics, Recreation and Tourism associated with the construction phase are provided in Table 14-17.

Table 14-17 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Private Property: Residential	High	As outlined in Chapter 2: Project Description, private residential dwellings have been excluded from the draft Order Limits. Therefore, there is no temporary or permanent land take from residential properties. The impact on agricultural farms and business is assessed in Chapter 5: Agriculture and Soils. There is potential for adverse impacts to residents living or travelling close to the Project during the construction phase as a result of increased construction traffic. The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could have impacts on road safety, journey times and severance (ability to cross the road) (see Chapter 16: Traffic and Transport).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Private Property: Commercial businesses	High	A potential temporary construction compound is proposed at the A1033 where the draft Order Limits cross between Patrington and Winestead. This compound is located within the outdoor storage space of a local business.	Medium	Temporary	Adverse	Direct
	High	There is potential for temporary adverse access impacts to local businesses due to temporary disruption associated with construction traffic. The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could have impacts on road safety, journey times and severance (ability to cross the road) (see Chapter 16: Traffic and Transport).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Commercial fisheries	High	There is potential for the physical presence of vessels associated with Project construction to obstruct other sea users, i.e., commercial fisheries. However, the industry as a whole is tolerable to a degree of displacement and is capable of recovery from short-term exclusions from an area. Additionally, considering the limited fishing activity in proximity to the Project, and the Project's lack of offshore interaction, significant interaction with the fisheries resource is not foreseen. The pipeline will avoid any static gear that may be located in the nearshore. Impacts associated with commercial fishing species is assessed within Chapter 7: Ecology and Biodiversity. Impacts are not expected to become significant enough to impact the fisheries resource as a whole.	Low	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Community Infrastructure	High / Medium	There is no temporary or permanent land take from community assets. There is potential for adverse impacts relating to access to community receptors within the local Study Area (Table 14-7) (for example temporary disruption), particularly those that are situated along proposed construction traffic routes. The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could have impacts on road safety, journey times and severance (ability to cross the road) (see Chapter 16: Traffic and Transport). Amenity impacts on users of community infrastructure could arise as a result of perceived environmental change during construction (e.g. noise, traffic disruption, reduction in visual amenity and air quality). Other PEIR assessments have concluded: • A potential impact on air quality from construction vehicle emissions during construction (see Chapter 6: Air Quality). • Potential visual impacts that could be experienced by local residents and recreational users from construction activities, however these are not expected to be significant (see Chapter 12: Landscape and Visual). • The noise assessment has not identified any significant effects during construction (see Chapter 13: Noise and Vibration). • The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could result in a loss of amenity for pedestrians (see Chapter 16: Traffic and Transport). There is the potential for amenity impacts on users of community infrastructure, although these are not predicted to be significant.	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Recreation						
Trans Pennine Trail	High	Horizontal Directional Drilling (HDD) will be used where the Project meets the TPT at the River Ouse. As such, there would not be any temporary or permanent impact on land use in this location to the TPT. The TPT route does not utilise roads within the local Study Area and therefore no access disruption is likely to be experienced as a result of construction traffic. Amenity impacts on users of the TPT arise as a result of perceived environmental change during construction (e.g. noise, traffic disruption, reduction in visual amenity and air quality). Other PEIR assessments have concluded:	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		- A potential impact on air quality from construction vehicle emissions during construction (see Chapter 6: Air Quality). - Potential visual impacts that could be experienced by local residents and recreational users from construction activities; however, these are not expected to be significant (see Chapter 12: Landscape and Visual). - The noise assessment has not identified any significant impacts during construction that could contribute to a wider amenity impact (see Chapter 13: Noise and Vibration). - The TPT does not utilise roads within the local Study Area and therefore users are not expected to experience loss of amenity due to construction traffic. There is the potential for amenity impacts on users of the TPT, although these are not predicted to be significant.				
National Cycle Routes	High	NCR 1 is crossed by the draft Order Limits and has the potential to be disrupted during construction. As stated in Chapter 2: Project Description, temporary measures would be put in place, such as diversions, to accommodate the continued use of recreational routes. NCR65 connects with the TPT, west of Barmby on Marsh, travelling along High Street and then west of Barmby on Marsh running perpendicular to two construction traffic access routes. There is the potential for increased construction traffic along NCR 65 (an on-road cycle path), which could impact users of the route. The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could have impacts on road safety, journey times and severance (ability to cross the road) (see Chapter 16: Traffic and Transport). Amenity impacts on users of the NCR arise as a result of perceived environmental change during construction (e.g. noise, traffic disruption, reduction in visual amenity and air quality). Other PEIR assessments have concluded: - A potential impact on air quality from construction vehicle emissions during construction (see Chapter 6: Air Quality). - Potential visual impacts that could be experienced by local residents and recreational users from construction activities; however, these are not expected to be significant (see Chapter 12: Landscape and Visual). - The noise assessment has not identified any significant impacts during construction that could contribute to a wider amenity impact (see Chapter 13: Noise and Vibration).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could result in a loss of amenity for pedestrians (see Chapter 16: Traffic and Transport). There is the potential for amenity impacts on users of community infrastructure, although these are not predicted to be significant.				
PRoW	Low	There could be potential impacts relating to change in access to PRoW across the Project as a result of temporary and permanent closures and diversions during construction. There are a number of PRoW that run adjacent or nearby to AGIs and temporary construction compounds. One PRoW, Easington Footpath No.2, requires a permanent closure. Construction of the Easington Pump Facility requires the permanent diversion of this PRoW. The diverted PRoW would be almost three times longer than the original PRoW and would follow the western edge of the Pump Facility before rejoining the Easington bridleway No.13. The remaining PRoWs are expected to either require temporary closures with diversions via a new temporary route, or will remain open with construction traffic crossings, where necessary. All of the LDWR outlined in Table 14-9 which fall within the draft Order Limits have the potential to be impacted during construction. As they consist of a number of PRoW, these walking routes will also be subjected to the temporary measures which would be put in place, such as diversions, to accommodate the continued use of routes. Impacts on LDWR have not been assessed separately as they have been included within the general assessment for PRoW. Amenity impacts on users of PRoW can arise as a result of perceived environmental change during construction (e.g. noise, traffic disruption, reduction in visual amenity and air quality). Other PEIR assessments have concluded: - A potential impact on air quality from construction vehicle emissions during construction (see Chapter 6: Air Quality). - Potential visual impacts that could be experienced by local residents and recreational users from construction activities; however, these are not expected to be significant (see Chapter 12: Landscape and Visual). - The noise assessment has not identified any significant impacts during construction that could contribute to a wider amenity impact (see Chapter 13: Noise and Vibration).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could result in a loss of amenity for pedestrians (see Chapter 16: Traffic and Transport). There is the potential for amenity impacts on users of PRow, although these are not predicted to be significant.				
Other recreation assets	Low	There is no temporary or permanent land take from other recreational assets. There is potential for adverse impacts relating to access to recreation receptors within the local Study Area (Table 14-10), particularly those that are situated adjacent to proposed construction traffic routes. The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could have impacts on road safety, journey times and severance (ability to cross the road) (see Chapter 16: Traffic and Transport). Additionally, there is the potential for amenity impacts on users of recreational assets such as parks, playparks and greenspace from increases in traffic flows (Chapter 16: Traffic and Transport), associated air quality impacts from construction vehicle emissions (Chapter 6: Air Quality) and localised visual impacts on recreational users of the landscape (Chapter 12: Landscape and Visual), although these are not predicted to be significant.	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Easington Beach	Low	There is the potential for temporary land use where the Project would interface with an offshore pipeline. As stated in Chapter 2: Project Description, after the pipeline has been installed, it would be buried and the beach would be reinstated to the pre-construction condition as far as reasonably practicable. Amenity impacts on users of Easington beach can arise as a result of perceived environmental change during construction (e.g. noise, traffic disruption, reduction in visual amenity and air quality). Other PEIR assessments have concluded: - A potential impact on air quality from construction vehicle emissions during construction (see Chapter 6: Air Quality). - Potential visual impacts that could be experienced by local residents and recreational users from construction activities; however, these are not expected to be significant (see Chapter 12: Landscape and Visual). - The noise assessment has not identified any significant impacts during construction that could contribute to a wider amenity impact (see Chapter 13: Noise and Vibration).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could result in a loss of amenity for pedestrians (see Chapter 16: Traffic and Transport). There is the potential for amenity impacts on users of Easington beach, although these are not predicted to be significant.				
Tourism						
Tourist assets	Medium - High	There is no temporary or permanent land take from tourism assets (for example tourist attractions or visitor accommodation). There are a number of tourism assets within the local Study Area (Table 14-12 and Table 14-13). There is the potential for temporary disruption of access to assets as a result of construction traffic, notably for assets adjacent to proposed construction traffic routes. The traffic and transport assessment has predicted an increase in 12-hour HGV flows on a number of local road links and on construction access routes which could have impacts on road safety, journey times and severance (ability to cross the road) (see Chapter 16: Traffic and Transport). Additionally, there is the potential for amenity impacts for visitors arising from increases in traffic flows (Chapter 16: Traffic and Transport), associated air quality impacts from construction vehicle emissions (Chapter 6: Air Quality) and localised visual impacts on recreational users of the landscape (Chapter 12: Landscape and Visual), although these are not predicted to be significant.	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Tourist Accommodation	Medium	It is expected that a reasonable proportion of the specialist construction workforce would come from outside the local area and so there would be a requirement for temporary worker accommodation within commuting distance of the Project such as rented housing, hotels, guest houses, bed and breakfast establishments / lodgings and official caravan parks. During the construction phase approximately 850 construction workers are estimated, peaking at 1,600. Assuming 25% of the workforce are coming from outside the wider Study Area, at peak, approximately 400 workers would require local accommodation. As described in Section 14.5 Baseline Conditions, there is estimated to be over 2,300 rooms available across the wider Study Area. At peak construction this would potentially reduce room availability by 17%, albeit some rooms offer multiple bedspaces. Therefore, it is considered that there would be sufficient capacity to meet the worker demand, although it would reduce availability for visitors seeking accommodation.	Low	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		At this stage, details on daily worker allowance are not available to calculate the revenue to tourism accommodation providers, however, it is estimated to be beneficial.				
Local Economy and Employment						
Local labour force	Medium	Construction of the Project has the potential to generate direct positive effects through the creation of new jobs. The estimated total number of construction workers involved in key construction activities is 850, peaking at approximately 100 persons per AGI and 300 persons for the Pump Facility. As it is not currently known if these activities will run concurrently, a high-case scenario assumes peak construction to be approximately 1,600. The Project is likely to require some proportion of its workers from outside the wider Study Area. It is assumed that 75% (1,200) of the workforce can be sourced locally. It is acknowledged that while not all jobs generated by the Project will be within the construction sector, the majority are anticipated to fall within this field. The construction workforce is expected to comprise a combination of highly specialised professionals and semi-skilled workers. According to ONS data, approximately 184,000 individuals are currently employed in the construction sector within the wider Study Area. Given the scale of local job creation, the potential impact on the local labour market is expected to be beneficial but not significant. It is acknowledged that the construction sector faces a notable skills gap and a growing need for recruitment to meet future demand, highlighting an opportunity to address workforce development challenges as part of the Project's implementation. Impacts arising from workforce displacement (labour churn) are not expected to be significant. Indirect and induced employment is expected as a result of job creation during the construction phase. Applying a construction multiplier of 1.4, it is estimated that a further 112 jobs would be created elsewhere in the wider Study Area as a result of the direct employment created by the Project.	Low	Construction Phase	Beneficial	Direct and Indirect
Local Economic Expenditure and Supply Chain						
Local supply chain	Medium	Job creation will bring with it associated construction workforce spending and use of local supply chains for services and materials. At this stage, details regarding the value of local construction procurement to support the construction phase of the Project is not available. However, given the sensitivity of the local supply chain and the number of indirect and induced jobs	Low	Temporary	Beneficial	Indirect

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		supported, it is expected that expenditure associated with the construction phase of the Project would be beneficial (although not significant).				

Operation

- 14.7.3 The potential impacts for Socio-economics, Recreation and Tourism associated with the operational phase are provided in Table 14-18.

Table 14-18 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Recreation Assets						
Easington Beach and Easington bridleway and footpath No.2.	Low	The Pump Facility will be less than 500m from Easington Beach, and adjacent to the proposed Easington bridleway. Both receptors have been assessed for potential amenity impacts on recreational users. Other PEIR assessments have concluded: - The visual impact from AGIs on receptors is not expected to be significant (see Chapter 12: Landscape and Visual). However, the visual impact of the Easington Pump Facility would be seen from a fairly wide area given the proposed maximum heights. - Noise levels generated by the operation of the Pump Facility at Easington have the potential to cause disturbance. Noise levels experienced by users of PRow will be included as part of the ES	To be assessed further during preparation of ES, but unlikely to be significant.	Permanent	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		informed by noise monitoring undertaken at the Pump Facility (see Chapter 13: Noise and Vibration). • Traffic and transport impacts have been scoped out of the operational phase (see Chapter 16: Traffic and Transport). • Potential for air quality impacts as a result of construction vehicle emissions during the operational phase (see Chapter 6: Air Quality). There is the potential for amenity impacts on users, however, given the existing dominance of the Perenco / Gassco industrial facilities next to the proposed Pump Facility, the impacts are likely to be reduced.				

Decommissioning

- 14.7.4 When the pipeline reaches the end of its design life, it would be decommissioned safely. The pipeline would be left in situ and permanently removed from service. The AGIs and Pump Facility would be safely dismantled, and it is anticipated that the same type of equipment, machinery and traffic routes would be used for the dismantling works as would be used for construction. The potential impacts for Socio-economics, Recreation and Tourism associated with the decommissioning phase are provided in Table 14-19.

Table 14-19 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Private Property	High	There is potential for adverse impacts to residents and commuters living or travelling close to the Project from the decommissioning process as a result of increased construction traffic. However, this is not expected to be significant. A transport appraisal of decommissioning effects will be undertaken and reported in the ES (see Chapter 16: Traffic and Transport).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Commercial Businesses	High	No land take impacts are expected on commercial businesses. There may be some localised disruption to access as a result of increased traffic, but this is not expected to be significant. A transport appraisal of decommissioning effects will be undertaken and reported in the ES (see Chapter 16: Traffic and Transport). No potential impacts are expected in relation to commercial fisheries.	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Community Infrastructure	Medium - High	No land take impacts are expected on community infrastructure. There could be temporary adverse impacts relating to disruption for users of community receptors as a result of road closures / diversions during dismantling of the AGIs and Pump Facility. A transport appraisal of decommissioning effects will be undertaken and reported in the ES (see Chapter 16: Traffic and Transport). There is the potential for amenity impacts on users of community infrastructure to arise as a result of perceived environmental change during decommissioning. Other PEIR assessments have concluded: • A potential impact on air quality from construction vehicle emissions during decommissioning (see Chapter 6: Air Quality). • High noise and vibration levels generated by the decommissioning phase activities resulting in potential disturbance or interference with activities, but noted that these are not likely to be significant (see Chapter 13: Noise and Vibration). • No visual impacts are predicted during decommissioning (see Chapter 12: Landscape and Visual). • A transport appraisal of decommissioning effects will be undertaken and reported in the ES (see Chapter 16: Traffic and Transport).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Recreation Assets						

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
NCN, PRow, LDWR, Easington Beach and other recreational assets	Low – High	There could be temporary adverse impacts relating to disruption to users of recreational assets due to road closures / footpath diversions during dismantling of the AGIs and Pump Facility. A transport appraisal of decommissioning effects will be undertaken and reported in the ES (see Chapter 16: Traffic and Transport). There is the potential for amenity impacts on users of NCN, PRow and other recreational assets to arise as a result of perceived environmental change during decommissioning. Other PEIR assessments have concluded: • A potential impact on air quality on human receptors during decommissioning, with further assessment reported in the ES (see Chapter 6: Air Quality). • High noise and vibration levels generated by the decommissioning phase activities resulting in potential disturbance or interference with activities, but not likely to be significant (see Chapter 13: Noise and Vibration). • No visual impacts are predicted during decommissioning (see Chapter 12: Landscape and Visual). • A transport appraisal of decommissioning effects will be undertaken and reported in the ES (see Chapter 16: Traffic and Transport).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Tourism						
Tourist assets	Medium - High	No land take impacts are expected in relation to tourism assets. There may be some temporary disruption to access as a result of increased traffic, but this is not expected to be significant. A transport appraisal of decommissioning effects will be undertaken and reported in the ES (see Chapter 16: Traffic and Transport). There is the potential for amenity impacts on visitor of tourist assets to arise as a result of perceived environmental change during decommissioning (e.g. noise, traffic disruption, reduction in visual amenity and air quality).	To be assessed further during preparation of ES, but unlikely to be significant.	Temporary	Adverse	Direct
Tourist accommodation	Medium	It is expected that a high proportion of the decommissioning phase workforce would come from outside the local area and so there would be a requirement for some temporary living accommodation within reasonable commuting distance of the Project (e.g. rented housing, hotels, guest houses, bed and breakfast establishments / lodgings and official caravan parks), although to a lesser degree than required at construction. It is not known at this stage how many decommissioning workers are likely to be required, how many would require local accommodation, in which locations and over what time periods.	Low	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		At this stage, it is reasonable to assume that given the accommodation available in the wider Study Area (Section 14.5 Baseline Conditions), there would be sufficient capacity to meet demand during the decommissioning phase.				
Local Economy and Employment						
Local labour force	Medium	There would be a beneficial impact on the local workforce through employment, upskilling and training opportunities generated during decommissioning of the Project. At this stage of the Project, the exact details of the proposed direct decommissioning employment, indirect employment and likely proportion of local people employed is not known (see Section 14.11 Next Steps).	Low	Temporary	Beneficial	Direct and Indirect
Local Economic Expenditure and Supply Chain						
Local supply chain	Medium	Decommissioning the Project will bring with it associated construction workforce spending and use of local supply chains for services and materials. At this stage, details relating to the value of local procurement to support the decommissioning phase of the Project are not available (see Section 14.11 Next Steps).	Low	Temporary	Beneficial	Indirect

14.8 Additional Mitigation and Enhancement Measures

- 14.8.1 The potential impacts have been informed by the impacts reported in Chapter 6: Air Quality, Chapter 12: Landscape and Visual, Chapter 13: Noise and Vibration and Chapter 16: Traffic and Transport. The summary of potential effects in these chapters take into account any topic-specific mitigation identified within the respective chapters. No further mitigation specific to the Socio-economics, Recreation and Tourism assessment is proposed during the construction and operation phase. Mitigation during decommissioning is likely to be the same as during construction.

14.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 14.9.1 Table 14-20 summarises the preliminary assessment of potential significant effects associated with the Project.

Table 14-20 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Commercial Business	High	Construction	A potential temporary construction compound is proposed at the A1033 where the draft Order Limits cross between Patrington and Winestead. This compound is located within the outdoor storage space of a local business. To be assessed further during preparation of ES.	Temporary	Ongoing engagement will take place with affected land and property owners in relation to potential impacts and appropriate mitigation measures identified.	Moderate Significant Effect

14.10 Next Steps

- 14.10.1 The ES will include a detailed assessment of the potential impacts on socio-economics, recreation, and tourism receptors during the construction, operation and decommissioning phases of the Project, in accordance with the methodologies set out in Section 14.4 Assessment Methodology.

Surveys

- 14.10.2 At this time, no additional surveys or site visits are proposed as part of the Socio-economics, Recreation and Tourism assessment.

Further Assessment

- 14.10.3 Any information gaps identified in this PEIR will be reviewed and addressed as part of the EIA process and reported in the ES, including the development of appropriate mitigation measures. The assessment will be further refined in response to relevant feedback received through Statutory Consultation and ongoing engagement with stakeholders.
- 14.10.4 A more detailed assessment of the Project's potential access and amenity impacts on socio-economic, recreation and tourism receptors will be carried out as part of preparation of the ES. In addition, the assessment of local economy and employment effects during construction and decommissioning will be refined as more detailed information on workforce requirements becomes available.

14.11 References

- Ref 14.1 Department for Energy Security and Net Zero (2023) *Overarching National Policy Statement for Energy (EN-1)* Available at: <https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1>
- Ref 14.2 Ministry of Housing, Communities and Local Government (MHCLG) (2023) *National Planning Policy Framework* Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>
- Ref 14.3 Selby District Council (2013) *Selby District Council Core Strategy Local Plan* Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN020024/EN020024-000682-SP13.pdf>

- Ref 14.4 Selby District Council (2022) *Selby District Council Local Plan* Publication Version Consultation 2022 Available at: <https://democracy.selby.gov.uk/documents/s16614/Appendix%201%20Publication%20Local%20Plan.pdf>
- Ref 14.5 East Riding of Yorkshire Council (2016) *East Riding Local Plan 2012-2029 Strategy Document* Available at: <https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/east-riding-local-plan/>
- Ref 14.6 North Lincolnshire Council (2011) *North Lincolnshire Local Development Framework Core Strategy* Available at: <https://m.northlincs.gov.uk/public/planningreports/corestratergy/adopteddpd/FullCoreStrategy.pdf>
- Ref 14.7 North East Lincolnshire Council (2013) *North East Lincolnshire Local Plan 2013 to 2032* Available at: <https://www.nelincs.gov.uk/assets/uploads/2018/05/20180518-AdoptedLocalPlan2018-WEB.pdf>
- Ref 14.8 Central Lincolnshire Joint Strategic Planning Committee (2023) *Central Lincolnshire Local Plan adopted* Available at: <https://www.n-kesteven.gov.uk/central-lincolnshire/adopted-local-plan-2023>
- Ref 14.9 Homes and Communities Agency (2014) *Additionality Guide Fourth Edition* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378177/additionality_guide_2014_full.pdf
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- Ref 14.11 Northern Endurance Partnership (NEP), 2023. *Offshore Environmental Statement for the Northern Endurance Partnership*. Reference: D/4271/2021. Document: NS051-EV-REP-000-00021. Available at: https://assets.publishing.service.gov.uk/media/651eba807309a1000db0a8d7/NS051-EV-REP-000-00021_NEP_Environmental_Statement__1_.pdf
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- Ref 14.13 Ministry of Housing, Communities & Local Government (MHCLG) (2019) *Indices of Multiple Deprivation 2019* Available at: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019>
- Ref 14.14 Visit Britain (2025) *Research and Insights* Available at: <https://www.visitbritain.org/research-insights>

- Ref 14.15 Visit North Yorkshire (2025) *STEAM Economic Evaluation - Visit North Yorkshire Business* Available at: <https://biz.visitnorthyorkshire.com/research-and-resources/steam-economic-evaluation/>
- Ref 14.16 Office for National Statistics (2021a) *Census 2021, TS007 - Age by single year* Available at: <https://www.Nomisweb.co.uk/datasets/c2021ts007>
- Ref 14.17 ONS (2025) *Claimant Count by sex and age* Available at: <https://www.Nomisweb.co.uk/sources/cc>
- Ref 14.18 Office for National Statistics (2021b) *Census 2021, TS066 - Economic activity status* Available at: <https://www.Nomisweb.co.uk/datasets/c2021ts066>
- Ref 14.19 Nomis (2025b) *Labour Market Profile – Yorkshire and The Humber* Available at: <https://www.Nomisweb.co.uk/reports/lmp/gor/2013265923/report.aspx>
- Ref 14.20 CITB (2023) *Focusing on the Skills Construction Needs* Available at: https://www.citb.co.uk/media/hwofsg5i/ctb1003_csn-rep_uk-full_aw.pdf
- Ref 14.21 ONS (2023) *Local indicators for Yorkshire and The Humber* Available at: <https://explore-local-statistics.beta.ons.gov.uk/areas/E12000003-yorkshire-and-the-humber/indicators>
- Ref 14.22 ICES (2025) *Maps, ICES statistical rectangles*. Available at: <https://www.ices.dk/data/maps/Pages/ICES-statistical-rectangles.aspx>
- Ref 14.23 EC (2025) EMODnet Map Viewer Available at: <https://emodnet.ec.europa.eu/geoviewer/#/>
- Ref 14.24 MMO (2024) UK sea fisheries annual statistics report 2023 Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2023>
- Ref 14.25 Defra (2022) Policy Paper, List of shellfish water protected areas in England Available at: <https://www.gov.uk/government/publications/water-framework-directive-shellfish-protected-areas/list-of-shellfish-water-protected-areas-in-england>
- Ref 14.26 Cefas (2025) England and Wales - Shellfish Classification Zones of England and Wales Available at: <https://data.cefas.co.uk/view/79>
- Ref 14.27 Sustrans (2025) *National Cycle Network* Available at: <https://www.sustrans.org.uk/find-a-route-on-the-national-cycle-network/?location=null&distance=null&routetype=null>
- Ref 14.28 Long Distance Walkers Association (LDWA) (2024) *Long Distance Walking Routes*. Available at: <https://ldwa.org.uk/>

- Ref 14.29 Natural England (2025) *King Charles III England Coast Path: improving public access to the coast* Available at: <https://www.gov.uk/government/collections/england-coast-path-improving-public-access-to-the-coast>
- Ref 14.30 Visit Britain (2024) *Quarterly and Annual Inbound Update UK's Nations & Regions*. Available at: <https://www.yorkshire.com/wp-content/uploads/2024/05/2023-IPS-Nations-and-Regions-Annual-Inbound-Update-Published-17th-May-2024-final.pdf>
- Ref 14.31 Visit North Yorkshire (2024). *North Yorkshire in Numbers*. Available at: <https://investeastyorkshire.co.uk/tourism/>
- Ref 14.32 Heart of Yorkshire (2022) *Visitor Economy at the Heart of Yorkshire 2022 - 2025*. Available at: <https://democracy.selby.gov.uk/documents/s16185/Appendix%20A%20Heart%20of%20Yorkshire%20Visitor%20Economy%20Strategy%20Refresh%202022%202025.pdf>
- Ref 14.33 VisitBritain. (2016) *England accommodation stock audit*. Available at: <https://www.visitbritain.org/research-insights/england-accommodation-stock-audit>
- Ref 14.34 VisitEngland (2023) *England Occupancy Survey*. Available at: <https://www.visitbritain.org/media/2924/download>
- Ref 14.35 VisitEngland (2024) *Most Visited Top 20 Free and Paid Attractions 2023* Available at: <https://www.visitbritain.org/research-insights/england-visitor-attractions-latest>
- Ref 14.36 ONS (2021) *Population Projections*. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2022based>

15 Human Health and Wellbeing

15.1 Introduction

- 15.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken for the assessment of Human Health and Wellbeing. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Volume 2 - Chapter 2: Project Description.
- 15.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Human Health and Wellbeing effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 15.1.3 This chapter should be read in conjunction with:
- Chapter 6: Air Quality, for the assessment of construction dust and air pollution.
 - Chapter 10: Ground Conditions and Hydrogeology, for the assessment of contaminated land and any potential pathways to human health.
 - Chapter 11: Cultural Heritage, for the assessment of heritage features that can contribute to positive wellbeing.
 - Chapter 12: Landscape and Visual, for the assessment of visual receptors and loss of visual amenity.
 - Chapter 13: Noise and Vibration, for the assessment of harmful noise effects and potential vibration disturbance.
 - Chapter 14: Socio-economics, Recreation and Tourism for the assessment of recreational facilities and Public Rights of Way (PRoWs).
 - Chapter 16: Traffic and Transport, for the assessment of pedestrian safety, traffic accidents, and intimidation.
 - Chapter 18: Hydrology and Land Drainage, for the assessment of potential changes to water quality, and
 - Chapter 19: Major Accidents and Disasters, for the assessment of unlikely events that may affect human health.
- 15.1.4 This chapter is supported by the following figure:
- Volume 3 - Figure 15.1: Study Area and Health and Wellbeing Receptors.
- 15.1.5 This chapter is not supported by any appendices.

15.2 Legislation, Policy and Guidance

Legislation

15.2.1 Legislation relevant to Human Health and Wellbeing is detailed in Table 15-1.

Table 15-1 - Summary of Legislation relevant to Human Health and Wellbeing

Legislation	How it is considered in this PEIR
The Equality Act (2010) (Ref 15.1)	The Equality Act 2010 protects people from discrimination in the workplace and in wider society. Protected characteristics comprise: • Age • Disability • Gender reassignment • Marriage and civil partnership • Race, including colour, nationality, ethnic or national origin • Religion or belief • Sex • Sexual orientation • Pregnancy and maternity Protected characteristics form part of the vulnerable groups that have been assessed separately throughout the chapter.
Infrastructure Planning (Environmental Impact Assessment) Regulations (2017) (Ref 15.2)	Under the Infrastructure Planning (EIA) Regulations, a number of topics are required to be assessed. This includes human health, with a description of the factors likely to be significantly affected by the development and a description of the likely significant effects. The chapter therefore considers the significance of any effects on Human Health and Wellbeing.
The Environment Act (2021) (Ref 15.3)	The Environment Act provides a legal and regulatory framework that directly and indirectly improves human health by addressing environmental risks and embedding health considerations into environmental planning.

Policy

National Planning Policy

- 15.2.2 National Planning Policy relevant to Human Health and Wellbeing is detailed in Table 15-2.

Table 15-2 – Summary of National Planning Policy relevant to Human Health and Wellbeing

Planning Policy Reference	Policy Context	How it is considered within this PEIR
EN-1		
Overarching National Policy Statement for Energy (EN-1) (2024) Paragraph 4.3.1 – 4.3.5 (Ref 15.4)	The National Policy Statement details that an ES should assess effects for each element of the project, identifying measures to avoid, reduce or compensate for health impacts. The policy highlights that effects resulting from other environmental topics should be assessed, but that regulation of these topics is considered effective mitigation.	The PEIR assesses the preliminary effects of each element of the Project, including an assessment of each environmental topic and will identify measures to avoid and reduce health impacts, if they occur.
Overarching National Policy Statement for Energy (EN-1) (2024) Section 4.4 (Ref 15.4)	The National Policy Statement details that an ES should assess effects on health and wellbeing, including from related topics and indirect impacts. The NPS particularly highlights potential impacts on vulnerable groups within society and those with protected characteristics under the Equality Act 2010.	This PEIR discusses the preliminary effects from other technical environmental topics and how any effects on human health and wellbeing will impact the general population and vulnerable groups identified within the Study Area.
NPPF		

Planning Policy Reference	Policy Context	How it is considered within this PEIR
National Planning Policy Framework (NPPF) (2024) Paragraph 96 – 102 (Ref 15.5)	The NPPF sets out a series of objectives and priorities for planning in England and how they should be applied. The overarching aim includes a social objective to support strong and healthy communities, with accessible services and open spaces. Section 8 specifies the objectives for promoting healthy and safe communities.	This PEIR chapter assesses the Project against the priorities within the NPPF. Any mitigation will be recommended to ensure the promotion of safe and healthy communities.

Local Planning Policy

- 15.2.3 Local Planning Policies relevant to Human Health and Wellbeing are detailed in Table 15-3.

Table 15-3 – Summary of Local Planning Policy relevant to Human Health and Wellbeing

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby District Council Local Plan (Selby District Council, 2022) (Ref 15.6) and Selby District Council Revised Pre-Submission Publication Local Plan (2024) (Ref 15.7).	Local Plan Objectives and Vision Policy SG4 - Development in the Countryside (Strategic Policy)	<i>The Council will seek to ensure that Selby District remains a special place to live by supporting development which protects and enhances the intrinsic character and beauty of the countryside, recognising the important role it plays in the local economy, for the health and well-being of local residents and as a biodiversity resource.</i>	The health and wellbeing assessment in this PEIR has taken into account loss of landscape views and those effects on the mental health and wellbeing of residents, as well as the potential for loss of opportunities for recreation and exercise.
	Policy SG9 - Design (Strategic Policy)	<i>“...B. Development should where appropriate seek to: Proposals for Major Development should be accompanied by a Health Impact Assessment Screening Checklist which will determine whether a full assessment is required;”</i>	The Human Health and Wellbeing assessment in this PEIR aligns to health impact assessment principles as it utilises the Institute of Environmental Management and Assessment (IEMA).
East Riding Local Plan 2012-2029 Strategy Document (East Riding of Yorkshire Council, 2016) (Ref 15.8).	Policy ENV1: Integrating high quality design	<i>“B Development will be supported where it achieves a high quality of design that optimises the potential of the site and contributes to a sense of place. This will be accomplished by: ... 6. Having regard to healthy lifestyles; ... 9. Promoting equality of safe access, movement and use;”</i>	The Human Health and Wellbeing assessment will recognise any potential negative effects on health and on the perception of safety and access throughout the PEIR mental health and wellbeing assessment in line with IEMA guidance.
North Lincolnshire Local Development Framework Core Strategy (North Lincolnshire Council, 2011) (Ref 15.9)	ST1 - Sustainable Development	<i>The Council will apply the principles of sustainable development through its planning policies and will have particular regard to: (a) ensuring social progress and equality of opportunity; (b) protecting the natural and built environment and the prudent use of natural resources, both locally and globally; (c) maintaining economic growth and employment.</i>	The Human Health and Wellbeing assessment assesses the Project's effects on health and wellbeing as they relate to equality, environmental change and economic growth throughout the PEIR.
North East Lincolnshire Local Plan 2013 to 2032 (Adopted 2018) (Ref 15.10)	SO5 Social and health inequality	<i>Narrow the gap in terms of social and health inequality by addressing issues of housing choice, providing accessible employment and training opportunities, promoting healthier lifestyles, providing healthcare and community facilities, improving educational attainment and cultural facilities; and establishing, protecting and maintaining a network of accessible good quality open space, sport and recreation facilities.</i>	The Human Health and Wellbeing assessment includes an assessment of access to employment, education and healthcare facilities, as well as opportunities for recreation and exercise. This draws on the conclusions of the Chapter 14: Socio-economics, Recreation and Tourism PEIR assessment, and will be updated for the ES assessment.
Lincolnshire Joint Health and Wellbeing Strategy (Lincolnshire County Council, 2024) (Ref 15.11).	Whole document	<i>E.g. Live well... Reduce inequalities by working to lower barriers to accessing services in areas of higher need.</i>	Mitigation for any potential physical and mental health effects will be identified through the Human Health and Wellbeing assessment and presented in this PEIR, particularly for any locations experiencing a number of effects in combination. This assessment will encompass vulnerable groups to identify areas of higher need and identify potential mitigations.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
North Yorkshire Joint Health and Wellbeing Strategy 2023-2030 (North Yorkshire Council, 2024) (Ref 15.12).	Whole document	<i>E.g.</i> <i>What we are going to do</i> • <i>Take opportunities to design environments that support healthy lives, including:</i> • <i>Physical activity – getting people moving more, supported by the council’s strategic leisure review with new operating model by 2027</i> • <i>Active travel routes and improved public transport including to increase education, employment and leisure opportunities as well as access to services</i> • <i>Improving indoor and outdoor air quality to reduce air pollution-related impacts</i>	The strategy sets out the objectives for North Yorkshire; the Human Health and Wellbeing assessment considers how the Project relates to relevant priorities and opportunities.
East Riding Joint Health and Wellbeing Strategy 2023-2028 (East Riding of Yorkshire Council, 2023) (Ref 15.13).	Priority Outcome 2 Working Age Adults Reduce Their Risk Of Ill Health	We want to ensure that Working Age Adults: Enjoy good mental health and emotional wellbeing. Have the opportunity to develop their skills and study towards qualifications in order to lift their aspirations and help them seek out new opportunities. Feel involved in their community and are aware of the variety of groups and support mechanisms available to help with their own health and wellbeing, and others. Lead healthy lifestyles to help embed prevention and build resilience. Are aware of the wider determinants of health and are aware of the support on offer to assist in creating the best conditions for health.	The joint health and wellbeing strategy promotes mental health and emotional wellbeing alongside a sense of community and involvement in the local area. The Human Health and Wellbeing assessment ensures the Project is compliant with these policies, and considers effects as they relate to the wider determinants of health.

Guidance

15.2.4 The Health and Wellbeing assessment has been carried out in accordance with the following guidance:

- Advice on the Content of Environmental Statements Accompanying an Application under the Nationally Significant Infrastructure Project (NSIP) Regime (Public Health England, 2021) (Ref 15.14) explains the required methodology for assessing impacts, alongside methodologies for defining potential significant effects and vulnerable groups.
- Health in Environmental Impact Assessment: A Primer for a Proportionate Approach (Institute of Environmental Management and Assessment (IEMA), 2017) (Ref 15.15) aims to guide EIA coverage of population and human health, focusing on proportionality and the opportunities and challenges presented.
- Effective Scoping of Human Health in Environmental Impact Assessment (IEMA, 2022) (Ref 15.16) explains when an EIA chapter should be prepared and when a standalone Health Impact Assessment would be required. The expectation is that the EIA Report will include a chapter on human health where wider determinants of health not covered by other EIA technical topics have been scoped in; or where other EIA technical topics have been scoped in to assess likely and potentially significant effects to human receptors, community amenities or services and there are likely and potentially significant population health implications from such assessments. Additionally, the guidance outlines that *“where the EIA follows IEMA guidance, the health chapter will align to HIA principles, including considering wider determinants of health and health inequalities”*.
- Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022) (Ref 15.17) promotes greater consistency in the assessment process, including how EIA health conclusions are reached, interpreted and used by all parties. This guidance explains how the magnitude of effect and sensitivity of receptors is applied to human health. Methodologies are set out and significance criteria established.
- The Mental Wellbeing Impact Assessment Toolkit (MWIA) (National MWIA Collaborative (England), 2011) (Ref 15.18) provides an evidence-based framework for assessing mental wellbeing. The MWIA screening toolkit is based around assessment against four ‘protective factors’ for mental wellbeing.

- Identification of vulnerable groups for inclusion in health and wellbeing assessments will be informed by guidance available from the Welsh Health Impact Assessment Support Unit (WHIASU, 2021) (Ref 15.19).
- The Marmot Review 'Fair Society, Healthy Lives' (Institute of Health Equity, 2010) (Ref 15.20) undertook a review into inequality and its relation to health. The Review contained policy recommendations to address the findings, including for the creation of healthy and sustainable communities, giving children the best start in life and ensuring a healthy standard of living for all. Health Equity in England: The Marmot Review 10 Years On (Institute of Health Equity, 2020) (Ref 15.21) built on the work of the original Marmot Review and examined why life expectancy has stalled in England and how health inequalities have grown in the previous decade.
- The UK Government White Paper 'Healthy Lives, Healthy People' (Department of Health and Social Care, 2010) (Ref 15.22) provides a framework for tackling the wider social determinants of health, presenting the UK Government's commitment to protecting the population from serious health threats; helping people live longer, healthier and more fulfilling lives; and improving the health of the poorest, fastest.

15.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 15.3.1 A summary of relevant parts of the EIA Scoping Opinion from the Planning Inspectorate (PINS) and the responses to this Scoping Opinion are outlined below

Table 15-4 – Summary of Scoping Opinion relevant to Human Health and Wellbeing

Section Reference	Matter	Comments	Response
ID 3.10.1	Operational phase	"Given the nature of the proposed development, the Inspectorate agrees with the applicant that significant effects on the health and wellbeing of the local population during the operational phase are unlikely. This matter can be scoped out of the ES"	Noted.
Historic England Written Response	Reference to Cultural Heritage	Para 14.5 Stakeholder engagement. There is no reference to cultural heritage. Table 14-8. Why is there no reference to cultural heritage here, particularly at Employment and Training benefits? Table 14-9. Again, no reference to cultural heritage.	Cultural Heritage and any potential effects to the historical environment have been considered within the Human Health and Wellbeing PEIR assessment, through the assessment of the effects of environmental change on mental and physical health. The Human Health and Wellbeing assessment draws on the conclusions of Chapter 11: Cultural Heritage.
North Yorkshire Council Written Response	Public Health	"...evidence identifying the impacts on a population though worry, fear and anxiety about the development can commence prior to the construction phase. As such, when assessing the impact upon populations in North Yorkshire the time frame should be from the date the scoping was made public; therefore, a pre-construction assessment and narrative should be included for population impacts. North Yorkshire has a higher proportion of older people than the national average, who may have greater health and social care needs. The impact of severance and closure of roads (including temporary and on-going closures) should be considered in relation to the population being able to access essential care services."	The Human Health and Wellbeing assessment considers potential impacts on mental health and wellbeing arising from the Project. The assessment will factor in vulnerable groups, including older people, and access to care and educational facilities.
UK Health and Security Agency	Content of chapter	We believe the summation of relevant issues into a specific section of the report provides a focus which ensures that public health is given adequate consideration. The section should summarise key information, risk assessments, proposed mitigation measures, conclusions and residual impacts relating to human health. In terms of the level of detail to be included in an ES, we recognise that the differing nature of projects is such that their impacts will vary. UKHSA and OHID's predecessor organisation Public Health England produced an advice document 'Advice on the content of Environmental Statements accompanying an application under the NSIP Regime', setting out aspects to be addressed within the Environmental Statement.	Aspects highlighted are addressed in the Human Health and Wellbeing assessment. The advice document referred to has helped to inform the assessment methodology.
	Electromagnetic Fields (EMFs)	For potential electromagnetic field (EMF) health impacts, UKHSA requests more information about the electrical infrastructure associated with the project. Please refer to the following code of practice, which defines the criteria for demonstrating compliance with the public exposure guidelines, including the	More information about the electrical infrastructure and resulting EMFs will be presented in the ES. The design will be undertaken in line with public exposure guidelines, and the Human Health and Wellbeing chapter will assess the mental and physical effects of the overhead lines, if they are required.

Section Reference	Matter	Comments	Response
		operational conditions for scoping out electrical infrastructure: Power Lines: Demonstrating compliance with EMF public exposure guidelines.	

Summary of Engagement

- 15.3.2 No specific engagement in relation to the Human Health and Wellbeing topic has taken place at the time of writing this PEIR chapter.

15.4 Assessment Methodology

Baseline Data

Study Area

- 15.4.1 The Study Area for the Human Health and Wellbeing assessment has been defined using professional judgement and experience of similar linear projects. The Study Area comprises wards located within and up to 500 m outside of the draft Order Limits. Data has been collected for Lower Layer Super Output Areas (LSOA) within the Study Area, where available. These wards and LSOAs are outlined in Table 15-5.

Table 15-5 – Wards and LSOAs within each Local Planning Authority (LPA) in the Study Area

Local Planning Authority	Ward	LSOA
Selby / North Yorkshire	Brayton	Selby 007c
	Camblesforth and Carlton	Selby 008A
		Selby 008B
		Selby 008C
East Riding of Yorkshire	Howden	East Riding of Yorkshire 037D
	Snaith, Airmyn, Rawcliffe and Marshland	East Riding of Yorkshire 042B
		East Riding of Yorkshire 040E
		East Riding of Yorkshire 042A
		East Riding of Yorkshire 040D
		East Riding of Yorkshire 041C
		East Riding of Yorkshire 041D
		East Riding of Yorkshire 038D

Local Planning Authority	Ward	LSOA
	South West Holderness	East Riding of Yorkshire 033C
		East Riding of Yorkshire 029C
		East Riding of Yorkshire 033D
		East Riding of Yorkshire 033E
	South East Holderness	East Riding of Yorkshire 031C
		East Riding of Yorkshire 031E
		East Riding of Yorkshire 039A
		East Riding of Yorkshire 039E
		East Riding of Yorkshire 039F
Kingston Upon Hull	Marfleet	Kingston Upon Hull 020B
North Lincs	Axholme North	North Lincolnshire 006B
		North Lincolnshire 006C
		North Lincolnshire 006D
		North Lincolnshire 006A
	Axholme Central	North Lincolnshire 020B
	Burton upon Stather and Winterton	North Lincolnshire 005D
		North Lincolnshire 005E
		North Lincolnshire 003B
		North Lincolnshire 003A
		North Lincolnshire 003D
		North Lincolnshire 003C
	Brigg and Wold	North Lincolnshire 011B
		North Lincolnshire 011A
	Barton	North Lincolnshire 001D
	Ferry	North Lincolnshire 004B
		North Lincolnshire 002C
		North Lincolnshire 002D
		North Lincolnshire 004D
		North Lincolnshire 004A
		North Lincolnshire 002B

Local Planning Authority	Ward	LSOA
		North Lincolnshire 002A
		North Lincolnshire 004C
West Lindsey	Caistor and Yarborough	West Lindsey 001G
North East Lincolnshire	Immingham	North Lincolnshire 001B

15.4.2 Where the assessment of health-related environmental change relies on data from other technical assessments (e.g. noise, air quality), the Study Area for that assessment will be referred to in the assessment. Where impacts are identified, additional information will be incorporated to understand population receptors in more detail, particularly vulnerable groups, how they will be impacted and to identify disproportionate effects and inequalities. This could include information at ward level.

15.4.3 Previous studies and calculations have shown that equipment operating at the proposed voltage and rating do not produce EMFs greater than typical background levels at distances of more than 200 m (Ref 15.23). Whilst the potential for effects to physical health arising from EMFs has been scoped out, it is recognised that there remains the potential for effects on mental health arising from perceived risk. Due to the nature of mental health effects, it is not possible to apply a Study Area.

Baseline Data Collection

15.4.4 The range of personal, social, economic, and environmental factors that influence health status are known as health determinants and include aspects such as the physical environment, income levels, employment, education, social support, and housing. Data has been collected to provide the baseline data for each of these health determinants, or to act as a proxy for assessment.

Desk Study Sources

15.4.5 Baseline conditions of the Project have been established using the following desk-based sources:

- Office for National Statistics Census 2021 data (Ref 15.24).
- Office for Health Improvement and Disparities online data (Ref 15.25).
- Department of Health and Social Care Fingertips Public Health (Ref 15.26).

- Baseline information from related technical aspect chapters of this Scoping Report.

Site Visits and Surveys

- 15.4.6 No site visits or surveys are proposed as part of the Human Health and Wellbeing assessment. This assessment has been undertaken as a desk-based study, using publicly available information.

Impact Assessment Methodology

Sensitivity

- 15.4.7 Table 15-6 summarises the methodology for determining sensitivity in relation to Human Health and Wellbeing (Ref 15.17). For the general population, sensitivity has been assigned to ward level. For the assessment of impacts on vulnerable groups, sensitivity has been assigned to the identified vulnerable group within each ward.
- 15.4.8 Baseline data will be used to inform the sensitivity to change of communities living in those wards which intersect with the draft Order Limits. The judgement of the indicative criteria in Table 15-6 is based on the most relevant criteria. It is likely in any given analysis that some criteria will span categories

Table 15-6 – Sensitivity criteria for Human Health and Wellbeing

Category / Level	Indicative criteria:
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the Project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and / or people with a very low capacity to adapt.
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a

Category / Level	Indicative criteria:
	lot of care; people with poor health status; and / or people with a limited capacity to adapt.
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and / or people with a high capacity to adapt.
Very Low	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or dependant); people with good health status; and / or people with a very high capacity to adapt.

Magnitude of Effect

- 15.4.9 Table 15-7 summarises how magnitude of effect has been determined in relation to Human Health and Wellbeing (Ref 15.17).
- 15.4.10 The judgement of the indicative criteria in Table 15-7 is based on the most relevant criteria. It is likely in any given analysis that some criteria will span categories.

Table 15-7 – Magnitude criteria for Human Health and Wellbeing

Category / Level	Indicative criteria:
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness / injury outcomes; majority of population affected; permanent change; substantial service quality implications.

Category / Level	Indicative criteria:
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications.
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications.
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

Significance

- 15.4.11 Table 15-8 sets out how significance levels have been determined. Where significance spans two outcomes, judgement will be applied based on context and criteria. Justification for significance levels is set out in Table 15-9.

Table 15-8 - Significance criteria

		Sensitivity			
Magnitude	High	Major	Major / moderate	Moderate / minor	Minor / negligible
	Medium	Major / moderate	Moderate	Minor	Minor / negligible
	Low	Moderate / minor	Minor	Minor	Negligible
	Negligible	Minor / negligible	Minor / negligible	Negligible	Negligible

Table 15-9 – Significance justification

Category / Level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
Major (significant)	The narrative explains that this is significant for public health because: • Changes, due to the Project, have a substantial effect on the ability to deliver current health policy and / or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity levels), and as informed by consultation themes among stakeholders, particularly public health stakeholders, that show consensus on the importance of the effect. • Changes, due to the Project, could result in a regulatory threshold or statutory standard being crossed (if applicable). • There is likely to be a substantial change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a causal relationship between changes that would result from the Project and changes to health outcomes. • In addition, health priorities for the relevant Study Area are of specific relevance to the determinant of health or population group affected by the Project.
Moderate (significant)	The narrative explains that this is significant for public health because: • Changes, due to the Project, have an influential effect on the ability to deliver current health policy and / or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show mixed views. • Changes, due to the Project, could result in a regulatory threshold or statutory standard being approached (if applicable). • There is likely to be a small change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a clear relationship between changes that would result from the Project and changes to health outcomes.

Category / Level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
	• In addition, health priorities for the relevant Study Area are of general relevance to the determinant of health or population group affected by the Project.
Minor (not significant)	The narrative explains that this is not significant for public health because: • Changes, due to the Project, have a marginal effect on the ability to deliver current health policy and / or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and / or that no relevant consultation themes emerge among stakeholders. • Changes, due to the Project, would be well within a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable). • There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and / or scientific literature showing there is only a suggestive relationship between changes that would result from the Project and changes to health outcomes. • In addition, health priorities for the relevant Study Area are of low relevance to the determinant of health or population group affected by the Project.
Negligible (not significant)	The narrative explains that this is not significant for public health because: • Changes, due to the Project, are not related to the ability to deliver current health policy and / or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the Project having no responses on this issue among stakeholders. • Changes, due to the Project, would not affect a regulatory threshold, statutory standard or guideline (if applicable). • There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and / or scientific literature showing there is an unsupported relationship between changes that would result from the Project and changes to health outcomes.

Category / Level	Indicative criteria (judgement based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
	• In addition, health priorities for the relevant Study Area are not relevant to the determinant of health or population group affected by the Project.

Assumptions and Limitations

15.4.12 The limitations of the assessment undertaken to date are:

- The baseline data has been undertaken as a desk-based study, using publicly available information. No site surveys have been undertaken for the purpose of this PEIR chapter.
- Data collected from third parties (e.g. Ordnance Survey Mapping, Office for National Statistics (ONS) data) are the most up-to-date data available at the time of writing. No significant limitations in these datasets have been identified. Baseline data will be kept under review throughout the production of the EIA in order to ensure that (where practicable) the most recently published data is utilised.
- Any assumptions and limitations related to the assessment and data collection for other technical aspect chapters and utilised in this chapter are also applicable.

15.5 Baseline Conditions

Existing Baseline

15.5.1 The World Health Organisation defines health as a '*state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*'. The range of personal, social, economic, and environmental factors that influence health status are known as health determinants and include a variety of aspects including physical environment, income levels, employment, education, social support, and housing. Baseline data has been collected that relates to these wider areas (for example population, socio-economic data, deprivation information).

Health-related Environmental Change

15.5.2 Demographic, recreation and deprivation data are presented in Chapter 14: Socio-economics, Recreation and Tourism. Baseline information relating to health-related environmental change is set out in the following chapters:

- Chapter 6: Air Quality.
- Chapter 10: Ground Conditions and Hydrogeology.
- Chapter 11: Cultural Heritage.
- Chapter 12: Landscape and Visual Amenity.
- Chapter 13: Noise and Vibration.
- Chapter 16: Traffic and Transport, and

- Chapter 18: Hydrology and Land Drainage.

Demographic and Socio-economic Data

Age and Sex

- 15.5.3 Throughout the Study Area, there is a generally ageing population when compared to the England average (Ref 15.24). South East Holderness and South West Holderness have the highest proportion of people aged 67 and over, each with 24% compared to the England average of 15%. Each ward within the Study Area has a higher proportion than the England average except Marfleet in Kingston Upon Hull, with 11% of the population over 68. This is consistent with the number of children and young people throughout the Study Area, as Marfleet has the highest proportion of those aged 0-4 and those between 5-18 years old (8% and 21% respectively). This is higher than the England average of 5% and 17% respectively. All other wards within the Study Area are in line with or slightly below the England average.
- 15.5.4 Ageing populations may be indicative of a lower birth rate, that people move to the area to retire or, conversely, families and young people moving out of the area to access employment, education and training opportunities.
- 15.5.5 The proportion of men and women throughout the Study Area is generally consistent with the England average of 49% men and 51% women (Ref 15.24). Areas which exhibit differences include an LSOA in Burton Upon Stather and Winterton ward (North Lincolnshire 003B) which has a low proportion of men (47%) and an LSOA in Marfleet ward (Kingston Upon Hull 020B) which shows 72% men and 28% women according to the 2021 Census.

Race and Ethnicity

- 15.5.6 In terms of ethnic diversity, the whole of the Study Area has a less diverse population than England as a whole. Marfleet, Axholme Central and Burton Upon Stather and Winterton are the most diverse wards within the Study Area, with 96% and 97% of the population identifying as white; the England average in contrast has 81% of the population identifying as white (Ref 15.24).
- 15.5.7 LSOAs East Riding of Yorkshire 041C and East Riding of Yorkshire 041D are the two LSOAs with the highest proportion of people reporting that English is not their first language, with 20% and 12% respectively. The rest of the Study Area is predominantly in line with England, with 0-3% of people reporting that English is not their main language (Ref 15.24).

Education

- 15.5.8 The educational picture across the Study Area is mixed, with some LSOAs reporting higher proportions of more qualified residents (e.g. degree level) than the England average of 41%, and many showing lower proportions. East Riding of Yorkshire 037D, North Lincolnshire 005E and Selby 007C have the lowest proportion of people with five GCSEs at A*-C as their highest qualification. East Riding of Yorkshire 041D in Snaith, Airmyn, Rawcliffe and Marshland ward has the highest proportion of people reporting that their highest level of education is GCSEs or lower, with 62%. Similarly, East Riding of Yorkshire 041D has the highest proportion of residents with no qualifications (Ref 15.26).

Economic Activity

- 15.5.9 The LSOA with the highest proportion of economically inactive people is East Riding of Yorkshire 039A in South East Holderness with 54%, followed by Kingston Upon Hull 020B with 52%. In East Riding of Yorkshire 039A, it is possible that this is a result of the aging population, with many residents likely retired. In Kingston Upon Hull 020B, due to the younger population, the lower rates of economic activity could be due to higher rates of disability and long-term sickness. All of the LSOAs within Selby local authority perform better than the England average, with Selby 008B having the lowest proportion of economically inactive people within the Study Area (33%). Following Selby 008B, the LSOA with the lowest proportion of economically inactive people is East Riding of Yorkshire 041C in Snaith, Airmyn, Rawcliffe and Marshland ward, with 34%. This could be reflective of the surrounding industry providing stable employment for the local populations. The average for England as a whole is 43.6% (Ref 15.26).

Deprivation

- 15.5.10 Two LSOAs within the Study Area fall into the 10% most deprived in England, according to the 2019 Indices of Multiple Deprivation (IMD) ranking. These are East Riding of Yorkshire 041C and Kingston Upon Hull 020B, with a ranking of 2,824 and 3,188 respectively, where 1 is the most deprived LSOA in England. North Lincolnshire 005E in Burton upon Stather and Winterton falls in the 20% least deprived LSOAs by ranking, with a ranking of 29,278. Selby 007C, Selby 008C, East Riding of Yorkshire 037D and West Lindsey 001G each all fall into the 20% least deprived LSOAs in England (Ref 15.25).
- 15.5.11 While the 2019 IMD scores are the most up to date at time of writing, further updates are understood to be planned for late 2025.

- 15.5.12 According to the Office for National Statistics (ONS), Kingston Upon Hull ranks as the 6th most income deprived local authority in England, with 22.7% of the population estimated to be income deprived, which is based on the proportion of people in an area who are out of work or on low earnings. North East Lincolnshire is the next most income deprived in the Study Area, with 19% of people estimated to be income deprived, making it the 26th most income deprived local authority area in England. Selby is the least income deprived local authority area in the Study Area, with 7.9% of the population estimated to be income deprived (Ref 15.24).

Health and Wellbeing Status

Life Expectancy and General Health

- 15.5.13 Life expectancy rates within the Study Area are generally in line with or slightly lower when compared to England. The life expectancy for males in Kingston Upon Hull deviates the most from the national average, at just under four years less than the average for England (75.3 years, compared to 79.1 years for England). The male life expectancy in Selby slightly exceeds the average for England, at 80.3 years (Ref 15.26).
- 15.5.14 For female life expectancy, Selby, East Riding of Yorkshire and West Lindsey exceed the England average of 83.1 years, with the other local authority areas having lower life expectancies when compared to the England national average. The lowest female life expectancy in the Study Area is Kingston Upon Hull (80.2 years), closely followed by North East Lincolnshire (80.9 years) (Ref 15.26).
- 15.5.15 Across child weight indicators at Year 6 age, the Study Area is generally on a par with England as a whole or better, with the exception being Kingston Upon Hull, with 42.2% of Year 6 aged children reported to be overweight or obese compared to the England average of 35.8% (Ref 15.25).
- 15.5.16 For adult weight indicators, the Study Area performs worse than England as a whole. The England average proportion of adults reported as overweight or obese is 64.5%; the best performing local authority area is Selby with 61.5%. All other local authority areas are worse than the England as a whole (Ref 15.26).
- 15.5.17 The child and adult weight indicators suggest that opportunities for exercise, active travel and outdoor recreation, as well as accessing healthy foods are potentially a challenge for this area, all of which are wider indicators of health.

Disability

- 15.5.18 Only two LSOAs within the Study Area have a lower proportion of people considered disabled under the Equality Act than England as a whole – these are Selby 007C and East Riding of Yorkshire 037D. East Riding of Yorkshire 039A in South East Holderness, and Kingston Upon Hull 020B have the highest proportion of disabled people in the Study Area, with 31% and 41% respectively. This is compared to the England average of 17.7% (Ref 15.24).

Mental Health and Life Satisfaction

- 15.5.19 The Annual Population Survey undertaken by the ONS asks personal wellbeing questions to adults aged 16 and over. The most recent survey reports the data as a score out of ten. The average score for happiness within the Study Area is in line with, or better than, the England average of 7.38. East Riding of Yorkshire has the lowest score of 7.30, whereas Selby and North Lincolnshire have the highest scores of 7.57 and 7.55 respectively. Similarly, the life satisfaction scores are similar to that of England as a whole (7.44). West Lindsey performs the best of local authorities in the Study Area, with a score of 7.81. Kingston Upon Hull, although having the lowest score of local authorities in the Study Area, is still in the region of the England average with a score of 7.39 (Ref 15.26).
- 15.5.20 The estimated prevalence of common mental disorders across the Study Area is broadly in line with the rate for England as a whole. Kingston Upon Hull performs the worst within the Study Area for both the 16 and over and 65 and over age groups, with 20.5% and 12.4% experiencing a common mental health disorder respectively, compared to England's 16.9% and 10.2%. Selby, as part of North Yorkshire, has the lowest rates for both of these age categories (14.1% and 9.2% for 16 years and over and 65 years and over respectively) (Ref 15.26).

Natural and Built Environment

Population Density and Green Space

- 15.5.21 Population density varies across the Study Area. England as a whole has an average population density of 279 people per square kilometre. The Study Area is predominantly rural, and therefore generally has a lower population density than the England average, although pockets of higher density are present throughout the Study Area. The LSOA with the highest population density is East Riding of Yorkshire 033E, which includes the village of Thorngumbald, followed by East Riding of Yorkshire 041C and East Riding of Yorkshire 041D,

which include the outer areas of Goole, and North Lincolnshire 001B, which includes Barton Upon Humber (Ref 15.26).

- 15.5.22 Access to green and blue spaces and the provision of green space per person across the Study Area is lower than the national average of 29 m². The highest provision in the Study Area is in North Lincolnshire with 29.02 m² per person; the lowest provision is 16.47 m² in North East Lincolnshire (Ref 15.27).

Crime Rates

- 15.5.23 The IMD crime domain helps identify areas with high levels of crime levels, using data for recorded violent crimes, burglaries, thefts, and criminal damage. East Riding of Yorkshire 041C and East Riding of Yorkshire 041D are the highest ranked LSOAs within the Study Area, both falling in the 20% most deprived LSOAs within the crime domain. North Lincolnshire 002B in Ferry is the lowest ranked LSOA within the Study Area, with a ranking of 31,769 (Ref 15.25).

Future Baseline

- 15.5.24 The future baseline is not expected to materially change within the lifecycle of the Project.
- 15.5.25 A succession of events have impacted both physical and mental health and wellbeing over the last twenty years, including the 2008 financial crisis (which led to public sector spending cuts), the Covid-19 pandemic and the subsequent cost of living crisis. These events have led to widening health inequalities in the UK as a result of socio-economic disparities, austerity measures, unequal access to healthcare, education gaps, unstable employment, poor housing, and lifestyle differences. Health inequalities are visible across the UK, including the Study Area, and disproportionately affect the most vulnerable groups in society. Communities facing socio-economic disadvantage experience poorer health outcomes, such as higher rates of chronic disease, mental health issues, and reduced life expectancy when compared to the UK average.
- 15.5.26 A number of policies and strategies are in place across the Study Area, aiming to address health and wellbeing inequalities and ensure the provision of health services, access to outdoor recreational facilities and improve the mental health and resilience of the population. Opportunities for improving skills and qualifications feature as aims across each of the Local Plans, highlighting the focus on creating resilient and economically active populations, reducing unemployment levels.

- 15.5.27 It is recognised that there are a number of other proposed and committed developments within the surrounding area that could alter the future baseline in the absence of the Project.

15.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 15.6.1 Construction, operation, maintenance and the eventual decommissioning of the Project has the potential to affect the physical and mental health of the general population and vulnerable groups within the population through environmental change.
- 15.6.2 While the Project has been designed to minimise any potential physical effects on human health, including the incorporation of the Leak Detection System (LDS) and with the draft Order Limits maintaining the distances from built-up areas, impacts on mental wellbeing can result from uncertainties and anxiety about the project. Vulnerable groups (e.g. older residents or people with pre-existing mental health conditions) could be more affected than others.
- 15.6.3 Ongoing and effective consultation will be held throughout the planning stages and the construction phase of the Project, providing the local community with more opportunities to understand the project, input to design and timescales. This clear and regular engagement is in line with the WHIASU protective factors to support community resilience, with the opportunity to have community voices heard. Providing the opportunity for inclusion in the decision-making process can help to reduce anxiety surrounding the Project and ensures inclusion, while maintaining the sense of control, helping to mitigate potential negative mental health effects.
- 15.6.4 At high enough levels, EMFs can be harmful to human health. Such levels are much greater than those produced by the UK electricity system. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) 'reference levels' for the public, which are the thresholds at which detailed investigations for compliance may be required, are: 100 μ T and 5 kV/m for electric fields. Permitted exposure levels are 360 μ T and 9 kV/m. While details of the electricity infrastructure to support the Project are not yet confirmed, the Project design will be developed to be compliant with existing legal requirements and standards for EMFs, which set limits on the permitted emissions.

Embedded Mitigation

15.6.5 Embedded mitigation measures are presented in Table 15-10.

Table 15-10 – Embedded Mitigation

Ref	Measure	Project phase	Responsible party
HH 1	Creation of and adherence to a Public Rights of Way (PRoW) Management Plan	Construction	Designer
HH 2	Production of and adherence to the Code of Construction Practice to minimise construction effects	Construction	Contractor
HH 3	Preparation of outline Construction Traffic Management Plan (CTMP) to accompany the DCO, which will detail the likely traffic routes should any diversions be required, minimising delays to traffic and maintaining access.	Construction	Designer / Contractor
HH 4	Any additional measures as laid out in other technical chapters to incorporate best practice measures and limit any potential introduction of additional noise, vibration, air pollution, water pollution or disruption of contaminated land that could affect physical health.	Construction and operation	Designer / Contractor
HH 5	Any additional measures as laid out in other technical chapters to incorporate best practice measures and limit any potential introduction of additional noise, vibration, landscape and visual effects, changes to the historic environment, road user stress, or any other aspect that could affect mental health.	Construction and operation	Designer / Contractor
HH 6	Disruption to or severance of PRoW will be avoided as far as possible. Where necessary, suitable diversions would be agreed with relevant local authority access officer.	Decommissioning	Designer

15.7 Preliminary Assessment of Potential Impacts

Construction

- 15.7.1 The potential impacts for Human Health and Wellbeing associated with the construction phase are provided in Table 15-11. For the assessment of health-related environmental changes, the effects have been drawn from the potential significant effects reported in the other technical chapters.

Table 15-11 – Construction Phase – Preliminary Assessment of Potential Impacts

Receptor / Resource	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Physical health for general population – health-related environmental change to baseline environmental conditions	Low	Air Quality: Potential increase in NO₂, PM₁₀ and PM_{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions within 200m of Non-Road Mobile Machinery and the affected road network. At time of writing this PEIR, the potential effects have not been modelled, and while effects are not likely to be significant, this cannot be confirmed at this stage. Climate Resilience: Changing weather patterns – for example prolonged drought leading to wildfires. Hydrology and Land Drainage: Temporary effects at watercourse crossings and construction sites, for example, due to the generation of silted runoff associated with over-pumping and dewatering activities may impact watercourse quality. There is also limited potential for break out of drilling muds at trenchless crossings. Reductions in watercourse quality can impact physical health through the loss of drinking water, or limitations in access to recreational areas. There is potential for a reduction in flood storage and an associated increase in flood risk, which could, in extreme situations, impact health through flooding of residential areas. Traffic and Transport: There is potential for the increase in length of road and PRow diversions to reduce participation in activities through the construction phase, thereby removing opportunities for exercise and	For the general population, any changes to air quality, unexpected weather patterns, loss of recreational and exercise routes, increases in flood risk or changes to water quality can lead to adverse physical health impacts, even in ‘healthy’ populations. The Human Health and Wellbeing assessment will continue to monitor the outcomes of other assessments and will present these findings in the ES. As effects will be limited to the construction phase and are considered to be transient in nature, the magnitude of impact is Low .	Construction phase	Adverse	Direct

Receptor / Resource	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		worsening physical health in the general population. At this stage, no significant effects have been identified for Ground Conditions and Hydrogeology, Noise and Vibration, Socio-economics, Recreation and Tourism, or Landscape and Visual Impacts. This will be monitored throughout the design phase of the Project and reported within the ES.				
Physical health for vulnerable groups – health-related environmental change to baseline environmental conditions	As the Study Area has a higher proportion of older people and disabled people, the sensitivity of this receptor is assessed as Medium, as these population groups may be less able to respond or adapt to change.	Air Quality: Potential increase in NO₂, PM₁₀ and PM_{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions within 200m of Non-Road Mobile Machinery and the affected road network. At time of writing this PEIR, the potential effects have not been modelled, and while effects are not likely to be significant, this cannot be confirmed at this stage. Climate Resilience: Changing weather patterns – prolonged drought leading to wildfires. Hydrology and Land Drainage: Temporary effects at watercourse crossings and construction works sites, for example, due to the generation of silted runoff and associated with over-pumping and dewatering activities may impact watercourse quality. There is also limited potential for break out of drilling muds at trenchless crossings. There is potential for a reduction in flood storage and an associated increase in flood risk, which could, in extreme situations, impact health through flooding of residential areas. Traffic and Transport: There is potential for the increase in length of road and PRow	For vulnerable populations, changes to air quality, unexpected weather patterns, transport and active travel opportunities, flood risk or water quality have the potential to adversely affect physical health, disproportionately affecting these groups compared to the general population. There are higher proportions of older and disabled people within the Study Area who may be more susceptible to change. As effects will be limited to the construction phase and are transient in nature, the magnitude of impact is Low .	Construction phase	Adverse	Direct

Receptor / Resource	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		diversions to reduce participation in activities through the construction phase, thereby removing opportunities for exercise and worsening physical health in vulnerable populations, who are more susceptible to changes in the environment. This may particularly affect those with reduced mobility.				
		At this stage, no significant effects have been identified for Ground Conditions and Hydrogeology, Noise and Vibration, Socio-economics, Recreation and Tourism, or Landscape and Visual Impacts. This will be monitored throughout the design phase of the Project and reported within the ES.				
Mental health for general population – health-related environmental change to baseline environmental conditions	Low	Environmental change during the construction phase could occur as a result of changes to Landscape and Visual Amenity, Water Environment, Ground Conditions and Hydrogeology, Agriculture and Soils, Traffic and Transport, Noise and Vibration, Cultural Heritage and Socio-economics, Recreation and Tourism. A combination of any or all of these potential effects has the potential to impact the mental wellbeing of the general population. As Construction Dust Assessments and Noise Modelling are yet to be undertaken, the assessment presented here is incomplete and will be reported in the ES. Those who own land that is impacted by the construction of the Project may experience additional stress caused by the loss of livelihood, but this will be compensated accordingly. For the general population, it is possible that witnessing the construction creates an effect, particularly where dust or traffic is visible to users of the road network or PRoW, or those	As effects are limited to the construction phase, the magnitude of impact is therefore Low .	Construction phase.	Adverse	Direct

Receptor / Resource	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		who are close to construction work. This is particularly relevant to Landscape and Visual effects, and the changing to the setting of heritage assets, where views are impacted as a result of construction works and traffic that alters the perception of the residents' environment. It is noted that the Socio-economics, Recreation and Tourism assessment discusses the potential beneficial impacts that the Project may have on job creation in the area. Combined impacts to specific areas as a result of effects identified in other chapters (significant or otherwise) may alter people's levels of satisfaction and potential engagement with their living environment. Additionally, a perceived reduction in road safety from the increase in HGV traffic, and a feeling of fear and intimidation, can impact the population's mental health, as described within Chapter 16: Traffic and Transport.				
Mental health for vulnerable groups – health-related environmental change to baseline environmental conditions	As the study area has a higher proportion of older people and disabled people, the sensitivity of this receptor is assessed as Medium , due to the generally poor health status and vulnerability.	Environmental change throughout the construction phase could occur as a result of changes to Landscape and Visual Amenity, Water Environment, Ground Conditions and Hydrogeology, Agriculture and Soils, Traffic and Transport, Noise and Vibration, Cultural Heritage and Socio-economics, Recreation and Tourism. A combination of any or all of these has the potential to impact the mental wellbeing of vulnerable groups. As Construction Dust Assessments and Noise Modelling are yet to be undertaken, the assessment presented here is incomplete and will be reported in the ES.	As effects are limited to the construction phase, the magnitude of impact is therefore Low .	Construction	Adverse	Direct

Receptor / Resource	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		Uncertainty surrounding the Project can lead to reduced use of PRowS, particularly where dust or traffic is visible to users of the road network or PRow, or those who are close to construction work. This is particularly relevant to Landscape and Visual effects, and the changing to the setting of heritage assets, where views are impacted as a result of construction works and traffic that alters the perception of the environment. Where HGVs and a reduction in safe walking routes and smaller pavements would occur, feelings of fear and intimidation may particularly affect wheelchair users, or parents with prams, each of whom would be vulnerable road users.				

Operation

- 15.7.2 The potential impacts for Human Health and Wellbeing associated with the operational phase are provided in Table 15-12. While the operation phase has been scoped out, a preliminary assessment of EMFs on mental and physical health has been undertaken in line with the scoping response from UKHSA.

Table 15-12 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Mental Health of general population as a result of perceived risk of EMFs	Low	The UK has a carefully thought-out set of policies for protecting against physical health impacts arising from EMFs, the main component of which is exposure guidelines, including the ICNIRP guidelines. .	Due to the minor change in quality of life, with a small minority of the general population affected, the magnitude is Low .	Throughout the operational phase and expected 25 year life cycle of the Project.	Adverse	Indirect
Mental Health of vulnerable groups as a result of perceived risk of EMFs	Sensitivity: Medium due to higher proportion of older people in the Study Area less able to adapt or respond to change.	Although the Project design shall minimise the physical risks to human health from EMFs, the public perception and understanding of EMFs can nevertheless lead to mental health concerns. The design of any electrical infrastructure to support the Project is not yet complete, and a full assessment will be undertaken and reported in the ES.	Due to the minor change in quality of life, with a small minority of the vulnerable population affected, the magnitude is Low .	Throughout the operational phase and expected 25 year life cycle of the Project.	Adverse	Indirect

Decommissioning

- 15.7.3 The potential impacts for Human Health and Wellbeing associated with the decommissioning phase are provided in Table 15-13.

Table 15-13 – Decommissioning Phase – Preliminary assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Physical health for general population – health-related environmental change to baseline environmental conditions	Low	Air Quality: Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions within 200m of Non-Road Mobile Machinery and the affected road network. At time of writing this PEIR, the potential effects have not been modelled, and while effects are not likely to be significant, this cannot be stated at this stage.	For the general population, any changes to air quality, flood risk or water quality can lead to adverse physical health impacts, even where people were previously considered ‘healthy’. The Human Health and Wellbeing assessment will continue to monitor the outcomes of this review. As effects will be limited to the decommissioning phase and are transient in nature, the magnitude of impact is Low .	Decommissioning phase	Adverse	Direct
		Hydrology and Land Drainage: Increased flood risk due to decommissioning of AGIs in the floodplains, where additional hardstanding may be required to facilitate the removal of the AGIs and Pump Facility and the grouting or the pipeline.				
		Traffic and Transport: There is potential for the increase in length of road and PRoW diversions to reduce participation in activities through the decommissioning phase, thereby removing opportunities for exercise and worsening physical health in the general population. This is expected to be much reduced in comparison to the construction phase, but further assessment will be undertaken and presented in the ES.				
		In this PEIR, no significant effects have been identified for Ground Conditions and Hydrogeology, Noise and Vibration, Socio-economics, Recreation and Tourism, or Landscape and Visual Impacts. This will be monitored throughout the design of the Project and reported within the ES.				
Physical health for vulnerable groups – health-related environmental change to baseline environmental conditions	Sensitivity: Medium due to higher proportion of older people in the Study Area less able to adapt or respond to change.	Air Quality: Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions within 200m of Non-Road Mobile Machinery and the affected road network. At time of writing this PEIR, the potential effects have not been modelled, and while effects are not likely to be significant, this cannot be stated at this stage.	For the vulnerable populations, any changes to air quality, accessibility or water quality can lead to adverse physical health impacts, even where people were previously considered ‘healthy’. The Health and Wellbeing assessment will continue to monitor the outcomes of this review. As effects will be limited to the decommissioning phase and are transient in nature, the magnitude of impact is Low .	Decommissioning phase	Adverse	Direct
		Hydrology and Land Drainage: Increased flood risk due to decommissioning of AGIs in the				

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		floodplains where additional hardstanding may be required to facilitate the removal of the AGIs and Pump Facility and the grouting or the pipeline.				
		Traffic and Transport: There is potential for the increase in length of road and PRow diversions to reduce participation in activities through the decommissioning phase, thereby removing opportunities for exercise and worsening physical health in vulnerable groups. This is expected to be much reduced in comparison to the construction phase, but further assessment will be undertaken and presented in the ES.				
		In this PEIR, no significant effects have been identified for Ground Conditions and Hydrogeology, Noise and Vibration, Socio-economics, Recreation and Tourism, or Landscape and Visual Impacts. This will be monitored throughout the design of the Project and reported within the ES.				
Mental health for general population – health-related environmental change to baseline environmental conditions	Low	Air Quality: Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions within 200m of Non-Road Mobile Machinery and the affected road network. At time of writing this PEIR, the potential effects have not been modelled, and while effects are not likely to be significant, this cannot be stated at this stage.	As effects are limited to the decommissioning phase, which is of limited duration, the magnitude of impact is therefore Low .	Decommissioning phase	Adverse	Direct
		Hydrology and Land Drainage: Increased flood risk due to decommissioning of AGIs in the floodplains. This may lead to additional stress around flooding and perceived loss of amenity.				
		Traffic and Transport: A perceived reduction in road safety from the increase in HGV traffic, and a feeling of fear and intimidation, can impact the population’s mental health. While data is not yet available for traffic levels within the decommissioning phase, this will be assessed and the results presented in the ES.				
		In this PEIR, no significant effects have been identified for Ground Conditions and Hydrogeology, Noise and Vibration, Socio-economics, Recreation and Tourism, or Landscape and Visual Impacts. This will be monitored throughout the design of the Project and reported within the ES.				

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Mental health for vulnerable groups – health-related environmental change to baseline environmental conditions	Sensitivity: Medium due to higher proportion of older people in the Study Area less able to adapt or respond to change	Air Quality: Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions within 200m of Non-Road Mobile Machinery and the affected road network. At time of writing this PEIR, the potential effects have not been modelled, and while effects are not likely to be significant, this cannot be stated at this stage.	As effects are limited to the decommissioning phase, which is of limited duration, the magnitude of impact is therefore low.	Decommissioning	Adverse	Direct
		Hydrology and Land Drainage: Increased flood risk due to decommissioning of AGIs in the floodplains. This may lead to additional stress around flooding and perceived loss of amenity.				
		Traffic and Transport: A perceived reduction in road safety from the increase in HGV traffic, and a feeling of fear and intimidation, can impact the population’s mental health. While data is not yet available for traffic levels within the decommissioning phase, this will be assessed and the results presented in the ES.				
		In this PEIR, no significant effects have been identified for Ground Conditions and Hydrogeology, Noise and Vibration, Socio-economics, Recreation and Tourism, or Landscape and Visual Impacts. This will be monitored throughout the design of the Project and reported within the ES.				

15.8 Additional Mitigation and Enhancement Measures

- 15.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 15.7.

Construction

- 15.8.2 No additional mitigation or enhancement measures, further to those described in the other technical chapters of this PEIR, are proposed for the Human Health and Wellbeing effects.

Operation

- 15.8.3 No additional mitigation or enhancement measures, further to those described in the other technical chapters of this PEIR, are proposed for the Human Health and Wellbeing effects.
- 15.8.4 Additional mitigation measures to strengthen protective factors to promote mental wellbeing include clear and non-technical information about electrical infrastructure and its compliance with UK guidance. This information demonstrates that any potential EMF risks will have been assessed and do not pose a risk to public health. This information will be presented in the ES and discussed with the public at consultation events if required. By facilitating engagement and providing opportunities for feedback and to ask questions, the Project will promote inclusion and enhance control, in line with the protective factors in the MWIA Toolkit.

Decommissioning

- 15.8.5 No additional mitigation or enhancement measures, further to those described in the other technical chapters of this PEIR, are proposed for the Human Health and Wellbeing effects.

15.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 15.9.1 Table 15-14 below summarises the preliminary assessment of potential significant effects associated with the Project.

Table 15-14 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / Resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significance of effect
Physical health for general population – health-related environmental change to baseline environmental conditions Sensitivity: Low	Low	Construction	At the time of writing, potential effects have been predicted within the Air Quality, Climate Resilience, Traffic and Transport and Hydrology and Land Drainage Chapters. The Health and Wellbeing assessment will continue to monitor the outcomes of other topic assessments. As effects will be limited to the construction phase and are transient in nature, the magnitude of impact is Low.	Limited to the construction phase.	Works are to be undertaken in line with the outline Construction Environmental Management Plan (CEMP) and Register of Environmental Actions and Commitments (REAC) to ensure best practice and minimise the potential for exposure to adverse air quality, flood risk, traffic and transport, water quality and any impacts that may be exacerbated by construction activities occurring during extreme weather events.	Minor - Not Significant
Physical health for vulnerable groups – health-related environmental change to baseline environmental conditions	Medium	Construction	At the time of writing, potential effects have been predicted within the Air Quality, Climate Resilience, Traffic and Transport and Hydrology and Land Drainage Chapters. The Health and Wellbeing assessment will continue to monitor the outcomes of other topic assessments. As effects will be limited to the construction phase and are transient in nature, the magnitude of impact is Low .	Limited to the construction phase	Works are to be undertaken in line with the CEMP and REAC to ensure best practice and minimise the potential for exposure to adverse air quality, water quality, flood risk, traffic and transport, and any impacts that may be exacerbated by construction activities occurring during extreme weather events.	Minor - Not Significant
Mental health for general population – health-related environmental change to baseline environmental conditions	Low	Construction	A combination of any or all of the identified environmental change potential effects that can impact the mental wellbeing of the general population. As effects are limited to the construction phase, the magnitude of impact is Low .	Limited to the construction phase.	Works are to be undertaken in line with the CEMP and REAC to ensure best practice and minimise the potential for exposure to adverse air quality, water quality, flood risk, traffic and transport, and any impacts that may be exacerbated by construction activities occurring during extreme weather events.	Minor - Not Significant
Mental health for vulnerable groups – health-related environmental change to baseline environmental conditions	Medium	Construction	A combination of any or all of the identified environmental change potential effects that can impact the mental wellbeing of vulnerable groups. As effects are limited to the construction phase, the magnitude of impact is Low .	Limited to the construction phase	Works are to be undertaken in line with the CEMP and REAC to ensure best practice and minimise the potential for exposure to adverse air quality, water quality, flood risk, traffic and transport, and any impacts that may be exacerbated by construction activities occurring during extreme weather events.	Minor – Not Significant

Receptor / Resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significance of effect
Mental Health of general population as a result of perceived risk of EMFs	Low	Operation	Although the Project design will minimise the risks of EMFs on human health, the public perception and understanding of EMFs can lead to concern relating to the operational phase and this has the potential for impacts to mental health outcomes.	Throughout the operation of the Project only.	Mitigation measures to strengthen public understanding include clear and non-technical information about electrical infrastructure and its compliance with UK guidance. This information will be presented in the ES and discussed with the public at consultation events as required. By facilitating engagement and providing opportunities for feedback and to ask questions, the Project will promote inclusion and enhance control, in line with the protective factors in the MWIA Toolkit. As the design of any electrical infrastructure to support the Project is not complete, a full assessment will be undertaken and reported in the ES.	Minor – Not Significant
Mental Health of vulnerable groups as a result of perceived risk of EMFs	Medium	Operation	Although the Project will minimise the risks of EMFs on human health, the public perception and understanding of EMFs can lead to concern relating to the operational phase and this has the potential for impacts to mental health outcomes.	Throughout the operation of the Project		Minor – Not Significant
Physical health for general population – health-related environmental change to baseline environmental conditions	Low	Decommissioning	For the general population, any changes to air quality, , flood risk, traffic and transport or water quality can lead to adverse physical health impacts, even for people considered to be generally ‘healthy’. The Health and Wellbeing assessment will continue to monitor the outcomes of other topic assessments. As effects will be limited to the decommissioning phase and are transient in nature, the magnitude of impact is Low .	Limited to the decommissioning phase	Works are to be undertaken in line with the Decommissioning Environmental Management Plan (DEMP) to ensure best practice and minimise the potential for exposure to adverse air quality, water quality and any impacts that may be exacerbated by decommissioning activities occurring during extreme weather events.	Minor – Not Significant
Physical health for vulnerable groups – health-related environmental change to baseline environmental conditions	Medium	Decommissioning	For the general population, any changes to air quality, , flood risk, traffic and transport or water quality can lead to adverse physical health impacts. The Health and Wellbeing assessment will continue to monitor the outcomes of other topic assessments. As effects are limited to the decommissioning phase, the magnitude of impact is therefore Low .	Limited to the decommissioning phase	Works are to be undertaken in line with the DEMP to ensure best practice and minimise the potential for exposure to adverse air quality, water quality and any impacts that may be exacerbated by decommissioning activities occurring during extreme weather events.	Minor – Not Significant
Mental health for general population – health-related environmental	Low	Decommissioning	Environmental change throughout the decommissioning phase could occur as a result of changes to Landscape and Visual Amenity, Water Environment, Ground Conditions and	Limited to the decommissioning phase	Works are to be undertaken in line with the DEMP to ensure best practice and minimise the potential for exposure to adverse air quality, water quality, flood risk, traffic and any impacts	Minor – Not Significant

Receptor / Resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significance of effect
change to baseline environmental conditions			Hydrogeology, Agriculture and Soils, Traffic and Transport, Noise and Vibration and Socio-economics, Recreation and Tourism, which can influence. It is the combination of any or all of these potential effects that can impact the mental wellbeing of the general population and vulnerable groups. The Health and Wellbeing assessment will continue to monitor the outcomes of other topic assessments. As effects are limited to the decommissioning phase, the magnitude of impact is therefore Low .		that may be exacerbated by decommissioning activities occurring during extreme weather events.	
Mental health for vulnerable groups – health-related environmental change to baseline environmental conditions	Medium	Decommissioning		Limited to the decommissioning phase	Works are to be undertaken in line with the DEMP to ensure best practice and minimise the potential for exposure to adverse air quality, water quality, flood risk, traffic and any impacts that may be exacerbated by decommissioning activities occurring during extreme weather events.	Minor – Not Significant

15.10 Next Steps

Engagement

- 15.10.1 Further consultation with relevant stakeholders shall be undertaken as required to define the scope and extent of the environmental aspects set out in the assessment above in the context of health and wellbeing. If, following stakeholder consultation feedback, further design refinement and further assessment, it is identified that additional mitigation measures are required, these will be detailed as part of the ES.

Surveys

- 15.10.2 No specific survey work will be undertaken for the assessment of the health and wellbeing baseline; the EIA will, however, draw on the survey results and conclusions undertaken for other technical topics.

Further Assessment

- 15.10.3 The assessments undertaken for the PEIR will be reviewed following stakeholder consultation feedback, and further design refinement. The assessment for health-related environmental change will continue, utilising the reported effects of the technical topic chapters, and will be reported in the ES.

15.11 References

- Ref 15.1 His Majesty's Stationery Office (2010). Equality Act 2010
- Ref 15.2 His Majesty's Stationery Office (2017) Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
- Ref 15.3 His Majesty's Stationery Office (2021). Environment Act 2021
- Ref 15.4 Department for Energy Security and Net Zero (2024). National Policy Statement for Energy (EN-1).
- Ref 15.5 Ministry of Housing, Communities & Local Government (2024). National Planning Policy Framework
- Ref 15.6 Selby District Council Local Plan
- Ref 15.7 Selby District Council Revised Pre-submission Publication Local Plan (2024)
- Ref 15.8 East Riding Local Plan 2012-2029 Strategy Document
- Ref 15.9 North Lincolnshire Local Development Framework Core Strategy
- Ref 15.10 North East Lincolnshire Local Plan 2013 to 2032 (Adopted 2018)

- Ref 15.11 Lincolnshire Joint Health and Wellbeing Strategy
- Ref 15.12 North Yorkshire Joint Health and Wellbeing Strategy 2023-2030
- Ref 15.13 East Riding Joint Health and Wellbeing Strategy 2023-2028
- Ref 15.14 Advice on the Content of Environmental Statements Accompanying an Application under the Nationally Significant Infrastructure Project (NSIP) Regime (Public Health England, 2021)
- Ref 15.15 Health in Environmental Impact Assessment: A Primer for a Proportionate Approach (Institute of Environmental Management and Assessment (IEMA), 2017)
- Ref 15.16 Effective Scoping of Human Health in Environmental Impact Assessment (IEMA, 2022)
- Ref 15.17 Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022)
- Ref 15.18 Mental Wellbeing Impact Assessment Toolkit (MWIA) (National MWIA Collaborative (England), 2011)
- Ref 15.19 Welsh Health Impact Assessment Support Unit (WHIASU, 2021)
- Ref 15.20 The Marmot Review 'Fair Society, Healthy Lives' (Institute of Health Equity, 2010)
- Ref 15.21 Health Equity in England: The Marmot Review 10 Years On
- Ref 15.22 Healthy Lives, Healthy People' (Department of Health and Social Care, 2010)
- Ref 15.23 Swanson, J. and Renew, D.C. (1994) Power Frequency Fields and People, Engineering Science and Education Journal Vol 3
- Ref 15.24 Office for National Statistics Census 2021 data
- Ref 15.25 Office for Health Improvement and Disparities online data
- Ref 15.26 Department of Health and Social Care Fingertips Public Health
- Ref 15.27 Fields in Trust, Green Space Index [online] Accessible at: <https://fieldsintrust.org/insights/green-space-index>

16 Traffic and Transport

16.1 Introduction

- 16.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Traffic and Transport. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 16.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Traffic and Transport effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 16.1.3 This chapter should be read in conjunction with:
- Chapter 6: Air Quality – This chapter uses the traffic data and analysis to assess the potential impacts of the associated emissions on environmental and public health and identifies measures to minimise these impacts.
 - Chapter 7: Ecology and Biodiversity - This chapter addresses the impact on traffic on the natural environment and proposes measures to minimise these impacts.
 - Chapter 8: Climate Resilience due to the influence of climate change on transport infrastructure.
 - Chapter 12: Landscape and Visual - This chapter assess the impact of the traffic infrastructure and activity, and how these impacts could be minimised.
 - Chapter 13: Noise and Vibration - This chapter assesses the impact of traffic on auditory and physical disturbance and identifies measures to minimise these impacts.
 - Chapter 14: Socio-economics, Recreation and Tourism- This chapter assesses the impact of traffic related impacts on the social and economic dynamics of the community and proposes measures to minimise these impacts.
 - Chapter 15: Human Health and Wellbeing - This chapter assesses the impact of traffic related impacts on public physical and mental health and quality of life and proposes measures to minimise these impacts.
 - Chapter 18: Hydrology and Land Drainage due to the potential for traffic / plant emissions associated with the Project to negatively affect water environment receptors.

16.1.4 This chapter is supported by the following figures contained in Volume 3:

- Figure 16.1: Construction Access Routes
- Figure 16.2: Sensitive Receptors
- Figure 16.3: Collision Data

16.1.5 This chapter is supported by the following appendices:

- Volume 4 - Appendix 16.1: Traffic and Transport Tables

16.2 Legislation, Policy and Guidance

Legislation

16.2.1 Legislation relevant to Traffic and Transport is detailed in Table 16-1.

Table 16-1 – Summary of Legislation relevant to Traffic and Transport

Legislation	How it is considered within this PEIR
Highways Act 1980 (Ref 16.1)	Outlines the duties of the highway authorities, and the management and operation of the highway network. The legislation most relevant to this Traffic and Transport chapter, include ' <i>Improvement to Highway</i> ,' which is covered in Part V, and ' <i>Environmental Impact Assessment</i> ,' which is covered in Part VA.
New Roads and Street Works Act 1991 (Ref 16.2)	Is an 'Act to amend the law relating to roads so as to enable new roads to be provided by new means; to make new provision with respect to street works.' The objectives of the Act are: • To ensure safety. • To minimise inconvenience to people using a street. • To protect the structure of the street and the apparatus in it Operatives must be on site when work is in progress, in addition to a supervisor to monitor the street works. They must both be registered with Street Works Qualifications Register (SWQR). It should be noted that regulations 'may make special provision in relation to street works in a street designated by the street authority as traffic-sensitive.'
Transport Act 2000 (Ref 16.3)	Includes ' <i>measures to create a more integrated transport system</i> ' with the aim of improving local passenger transport services, alongside reducing congestion and pollution. This is exemplified by the requirement for local authorities to prepare, publish and review a local transport plan to achieve the outlined aims of this legislation. These plans will be taken into consideration in the assessment of Traffic and Transport.
Planning Act 2008 (Ref 16.4)	Due to the nature, scale and elements of the Project, it has been classified as a Nationally Significant Infrastructure Project (NSIP) within the Part 3 'Energy' chapter, under section 20 of the Planning Act 2008. The Planning Act 2008 outlines the thresholds for NSIPs in the energy sector, empowering the Planning Inspectorate

Legislation	How it is considered within this PEIR
	(PINS) to examine applications and make recommendations to the Secretary of State (SoS). The Applicant is therefore required to make an application to the Secretary of State for a DCO to authorise the Project.

Policy

National Planning Policy

- 16.2.2 National Planning Policy relevant to Traffic and Transport is detailed in Table 16-2.

Table 16-2 – Summary of National Planning Policy relevant to Traffic and Transport

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Overarching National Policy Statement for Energy EN-1 (Ref 16.5)		
5.14	The document sets out information relating to traffic and transport impacts and the policy in respect of these impacts. This section acknowledges that the transportation of materials, goods and personnel to and from the development can impact the surrounding transport infrastructure, and in some instances the connecting transport networks.	The assessment takes into consideration the baseline conditions, which includes the traffic and transport infrastructure in the area along the construction route and in the vicinity of the Project. A review of all relevant transport related policies has been undertaken and is reported within this PEIR will be included in the Environmental Statement (ES). Engagement has been undertaken on the Project with National Highways (NH) and the relevant Local Highway Authorities (LHAs) to gather local knowledge and highlight any concerns. Feedback on these have been noted and are being processed. LHAs have taken the information for further review to provide additional comments. Further discussion will be held on the findings of the assessment and mitigation and reported in the ES. Additionally, an in-depth analysis of the potential implications on the transportation of materials, goods and personnel to and from the Project can impact the local traffic conditions, road safety and the capacity of the road network will be undertaken and reported in the ES. This will also consider the cumulative effects of the Project along with other planned development and infrastructure projects. Appropriate mitigation measures will be implemented to mitigate and minimise the identified impacts.
5.14.1	Paragraph 5.14.1 states ‘The transport of materials, goods and personnel to and from a development during all project phases can have a variety of impacts on the surrounding transport infrastructure and potentially on connecting transport networks, for example through increased congestion. Impacts may include economic, social and environmental effects.’	To reduce congestion on the highway network, movement of freight will be redistributed to other modes where possible. An in-depth analysis of the potential implications on the transportation of materials, goods and personnel to and from the Project can impact the local traffic conditions, road safety and the capacity of the road network will be undertaken and reported in the ES. This includes undertaking a cumulative impact assessment to consider the cumulative effects of the Project in conjunction with other planned development and infrastructure projects during peak activity.
5.14.4	Paragraph 5.14.4 states ‘The consideration and mitigation of transport impacts is an essential part of Government’s wider policy objectives for sustainable development as set out in Section 2.6 of this NPS’	Appropriate mitigation measures will be implemented to mitigate and minimise the identified impacts. Preliminary mitigation measures have been identified in Section 16.8. Further mitigation measures will be identified and embedded into the design and reported in the ES and accompanying Outline Construction Traffic Management Plan (CTMP).
5.14.6	Paragraph 5.14.6 states ‘National Highways and Highways Authorities are statutory consultees on NSIP applications including energy infrastructure where it is expected to affect the strategic road network and / or have an impact on the local road network. Applicants should consult with National Highways and Highways Authorities as appropriate on the assessment and mitigation to inform the application to be submitted’.	Engagement has been undertaken on the Project with NH and the relevant LHA. They have been informed of the proposed Construction Access Routes. Feedback on these have been noted and are being processed. LHAs have taken the information for further review to provide additional comments. Further discussion will be held on the findings of the assessment and mitigation and reported in the ES. Engagement which has been undertaken so far is summarised in section 16.3.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
5.14.11	Paragraph 5.14.11 states ‘Where mitigation is needed, possible demand management measures must be considered. This could include identifying opportunities to: • Reduce the need to travel by consolidating trips, • Locate development in areas already accessible by active travel and public transport, • Provide opportunities for shared mobility, • Re-mode by shifting travel to a sustainable mode that is more beneficial to the network, • Retime travel outside of the known peak times, • Reroute to use parts of the network that are less busy’	Appropriate mitigation measures will be implemented to mitigate and minimise the identified impacts. Preliminary mitigation measures have been identified in Section 16.8. Further mitigation measures will be identified and embedded into the design and reported in the ES and accompanying Outline CTMP.
5.14.21	Paragraph 5.14.21 states that ‘The Secretary of State should only consider refusing development on highways grounds if there would be an unacceptable impact on highway safety, residual cumulative impacts on the road network would be severe, or it does not show how consideration has been given to the provision of adequate active public or shared transport access and provision.’	An in-depth analysis of the potential implications on the transportation of materials, goods and personnel to and from the Project can impact the local traffic conditions, road safety and the capacity of the road network will be undertaken in the ES. This includes undertaking a cumulative impact assessment to consider the cumulative effects of the Project in conjunction with other planned development and infrastructure projects during peak activity. Mitigation measures will be implemented where necessary to reduce the effect of traffic and transport on the highway to prevent unacceptable highway safety impacts. Preliminary mitigation measures have been identified in Section 16.8. Further mitigation measures will be identified and reported in the ES and within the Outline CTMP.
National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines EN-4 (Ref 16.6)		
1.1.6	Paragraph 1.1.6 states ‘This NPS, taken together with the ‘Overarching National Policy Statement for Energy’ (EN-1), provides the primary policy for decisions by the Secretary of State on applications it receives for natural gas supply infrastructure and gas and oil pipelines as defined at Section 1.6 of this NPS.’	The ES will assess the environmental impacts associated with traffic as set out in these NPSs which will include identifying significant effects, undertaking engagement with all relevant stakeholders, and identifying appropriate mitigation measures.
1.1.8	Paragraph 1.1.8 states ‘Applicants should ensure that their applications, and any accompanying supporting documents and information, are consistent with the instructions and guidance given to applicants in this NPS, EN-1 and any other NPSs that are relevant to the application in question.’	The ES will assess the environmental impacts associated with traffic as set out in these NPSs which will include identifying significant effects, undertaking engagement with all relevant stakeholders, and identifying appropriate mitigation measures.
National Planning Policy Framework (NPPF) (Ref 16.7)		

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	The NPPF sets out the Government’s economic, environmental, and social planning policies for England. Taken together, these policies articulate the Government’s vision of sustainable development, which should be interpreted and applied locally to meet local aspirations. Paragraph 116 of the NPPF indicates that ‘development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network, following mitigation, would be severe, taking into account all reasonable future scenarios.’	The assessment takes into consideration the baseline conditions, which includes the traffic and transport infrastructure in the area along the construction route and in the vicinity of the Project. A review of all relevant transport related policies has been undertaken and is reported within this PEIR and ES. Alternative sustainable modes for freight such as rail and water are being considered to mitigate traffic on the highway network. Engagement has been undertaken on the Project with NH and the relevant LHAs to gather local knowledge and highlight any concerns. Feedback on these have been noted and are being processed. LHAs have taken the information for further review to provide additional comments. Further discussion will be held on the findings of the assessment and mitigation and reported in the ES. Additionally, an in-depth analysis of the potential implications on the transportation of materials, goods and personnel to and from the Project can impact the local traffic conditions, road safety and the capacity of the road network will be undertaken. This will also consider the cumulative effects of the Project along with other planned development and infrastructure projects. Appropriate mitigation measures will be implemented to mitigate and minimise the identified impacts.
Paragraph 109	Transport specific policies are also highlighted throughout the NPPF with Paragraph 109 stating that: ‘Transport issues should be considered from the earliest stages of plan-making and development proposals, using a vision-led approach to identify transport solutions that deliver well-designed, sustainable and popular places. This should involve: • Making transport considerations an important part of early engagement with local communities. • Ensuring patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places. • Understanding and addressing the potential impacts of development on transport networks. • Realising opportunities from existing or proposed transport infrastructure, and changing transport technology and usage – for example in relation to the	Transport issues have been considered from the beginning stages of plan-making, Project proposals and the design process. Engagement has been undertaken on the Project with NH and the relevant LHAs to gather local knowledge and highlight any concerns. Feedback on these have been noted and are being processed. LHAs have taken the information for further review to provide additional comments. Further discussion will be held on the findings of the assessment and mitigation and reported in the ES. Appropriate opportunities to promote sustainable transport modes will be identified, given the type of Project and its location. Additionally, an in-depth analysis of the potential implications on the transportation of materials, goods and personnel to and from the Project can impact the local traffic conditions, road safety and the capacity of the road network will be undertaken and reported in the ES. Appropriate mitigation measures will be implemented to mitigate and minimise the identified impacts.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	scale, location or density of development that can be accommodated. - Identifying and pursuing opportunities to promote walking, cycling and public transport use. - Identifying, assessing and taking into account the environmental impacts of traffic and transport infrastructure – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains.’	
Paragraph 115	Paragraph 115 of the NPPF states ‘assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that: - Sustainable transport modes are prioritised taking account of the vision for the site, the type of development and its location. - Safe and suitable access to the site can be achieved for all users. - The design of streets, parking areas, other transport elements and the content of associated standards reflects current national guidance, including the National Design Guide and the National Model Design Code. - Any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree through a vision-led approach.’	Appropriate opportunities to promote sustainable transport modes will be identified, given the type of Project and its location. Any alterations to the highway network will take into consideration the associated standards reflect current national guidance, including the National Design Guide and the National Model Design Code. Additionally, any significant impacts of the Project on the transport network (in terms of capacity and congestion), or on highway safety, can be effectively mitigated to an acceptable degree.
Paragraph 116	Paragraph 116 of the NPPF indicates that development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network, following mitigation, would be severe, taking into account all reasonable future scenarios.	An analysis of the potential implications of the transportation of materials, goods and personnel to and from the Project on local traffic conditions will be undertaken and reported in the ES. This will include a review of road safety and the capacity of the road network. Cumulative effects of the Project along with other planned development and infrastructure projects will be considered. Appropriate mitigation measures will be implemented to mitigate and minimise the identified impacts.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Paragraph 199	Paragraph 199 of the NPPF states that: <i>‘Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management.’</i> This policy shows that the need to manage all traffic is essential to protect the natural environment as much as reasonably possible.	Appropriate mitigation measures will be incorporated to mitigate and minimise the identified impacts. This will be reported within the ES and Outline CTMP.

Local Planning Policy

- 16.2.3 Local Planning Policies relevant to Traffic and Transport is detailed in Table 16-3.

Table 16-3 – Summary of Local Planning Policy relevant to Traffic and Transport

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
East Riding of Yorkshire Local Transport Plan 2021-2039 (Ref 16.8)		The six strategic objectives for this LTP are as follows: • Improve the maintenance and management of the existing transport network. • Support sustainable economic growth and regeneration. • Reduce carbon emissions. • Improve road safety. • Support and encourage healthy lifestyles. • Improve access to key services. In respect of the HGV route network, the LTP Strategy Network Management Plan states that: “The Council has a responsibility to direct HGV drivers along the most appropriate routes and reduce the risk of HGV using unsuitable roads, which can result in safety, noise and vibration concerns for local residents. The Council has developed a preferred HGV route network which is clearly signed and is included on a freight Map of the East Riding.” With regard to Abnormal Loads, the LTP Strategy Network Management Plan states that: “The Council has an established process in place to manage the movement of abnormal loads on the highway network. This is advertised through a dedicated page on the Council’s website. Hauliers are asked to contact the Council at least six weeks in advance of the proposed move with the details of their journey to allow officers to plan the most appropriate route and arrange for the movement of street furniture if required.”	Project engagement has been undertaken with NH and the relevant LHAs to gather local knowledge and highlight any concerns. Feedback from this engagement has been noted and is being processed. Current engagement has been identified in Section 16.4. LHAs have taken the information for further review to provide additional comments. Further discussion will be held on the findings of the assessment and mitigation and reported in the ES. It is anticipated that the Project may require abnormal load deliveries during the construction phase. Therefore, the Main Works Contractor will work with East Riding of Yorkshire to ensure adherence to the Network Management Plan (NMP) and to develop relevant construction control measures regarding Abnormal Indivisible Loads which will be outlined within the Outline CTMP. The proposed Construction Access Routes are shown in Volume 3 - Figure 16.1.
North Lincolnshire Local Development Framework Core Strategy (Ref 16.9)	CS25: Promoting Sustainable Transport	The Core Strategy, which was adopted in June 2011, sets out the long-term vision for North Lincolnshire and provides a blueprint for managing growth and development in the area up to 2026. The transport network section states: “The council will support and promote a sustainable transport system in North Lincolnshire that offers a choice of transport modes and reduces the need to travel through spatial planning and design and by utilising a range of demand and network management tools: Support the development of a freight strategy to include lorry parking sites, HGV route management and provision of facilities for (and promote the benefits of) transferring freight delivery from road to rail and / or water	Alternative modes have been taken into consideration within the Project of the Construction Access Routes, and sustainable options have been explored.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		transport, wherever practical, particularly in relation to the movement of freight to and from the South Humber Ports and Trent Wharves”	
North Lincolnshire’s Road safety measures in North Lincolnshire (Ref 16.10)		With regard to freight routes and HGV signing the policy indicates that: • To reduce the number of heavy goods vehicles (HGV) travelling along residential and other unsuitable roads, freight routes have been created in North Lincolnshire. • Roads unsuitable for HGV are signed with the restrictions. The council will put restrictions on roads that they consider to be unsuitable for HGV. • Any load over 40 tonnes is classed as abnormal and the haulier must inform the police and receive permission to move it on the roads.	Additionally, when developing the Construction Access Routes, primary consideration was given to: • The use of the shortest route from the location of access points to the Strategic Road Network (SRN), comprised generally of motorways and major A roads. • As far as possible the use A roads as a priority, then B roads, then C roads and then unclassified roads. • Avoiding settlements and sensitive receptors such as schools and other high-risk locations to minimise the impact on villages and towns and sensitive road users, and • Avoiding dangerous or poorly suited intersections. Mitigation measures will be contained within the Outline CTMP and will be discussed and agreed with NH and the LHAs. Police will be informed, and permission will be sought for any loads classified as abnormal. Abnormal loads will only travel to / from the Site once any required permissions have been granted. This will be identified in the Outline CTMP.
North Lincolnshire’s Third Local Transport Plan 2011-2026 (Ref 16.11)		The long-term vision for transport in North Lincolnshire is: “A well-maintained transport system that supports sustainable communities within a safe and prosperous environment and which contributes to the wider environmental, economic and social wellbeing of the people who live and work in North Lincolnshire.” Relevant to this assessment Local Transport Goals for North Lincolnshire include: • Reduce transport related carbon dioxide emissions and protect and enhance the natural and built environment through sustainable transport solutions. • Improve transport safety and security relating to death or injury from transport, to contribute towards safer and stronger communities. Provide equal opportunities through improvements in accessibility to key local hubs and services by sustainable modes of transport.	The Traffic and Transport assessment will detail the changes in baseline traffic flows on road links along the proposed construction route to and from the Project Access Points; determine potential environmental effects associated with construction traffic generated by the Project, if any; and to ensure that appropriate construction control measures are identified in the Outline CTMP to minimise any potential impact as much as possible. Additionally, when developing the Construction Access Routes, appropriate consideration was given to using the shortest route from the location of access points to the SRN, comprising generally of motorways and major A roads. This should reduce travel time and also allows for the most suitable routes to be used.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
East Riding Local Plan (adopted April 2025) (Ref 16.12)	Policy EC4	Enhancing sustainable transport specifies that development proposals should: • Produce and agree a transport assessment and travel plan, where a significant transport impact is likely. • Bring forward other necessary transport infrastructure to accommodate expected movement to and from the development. “Developments generating significant freight movement located along the East-West Multi-Modal Transport Corridor should capitalise on the opportunities for transferring and transporting freight by means other than road.”	Alternative and more sustainable modes for the transportation of freight are being considered by the Project e.g. rail and water. Any feasible measures arising from this assessment will be included within the Outline CTMP.
	Policy EC5	Supporting the energy sector stipulates that proposals for the development of the energy sector, including Carbon Capture and Storage (CCS), will be supported where any significant adverse impacts are addressed satisfactorily and the residual harm is outweighed by the wider benefits of the proposal. The policy indicates that developments and their associated infrastructure should be acceptable in terms of the effect of development on traffic transport, including the opportunity to use waterways and rail for transportation of materials and fuel, and the capacity of the road network to accommodate development.	The Traffic and Transport assessment considers the traffic generation of the Project during the construction and operational phases and how this will affect receptors located within the Study Area. The assessment will: • Detail the changes in traffic flows on road links along the proposed construction route to and from the Site. • Determine potential environmental effects associated with construction traffic generated by the Project, if any, and • Ensure that appropriate construction control measures are identified in the Outline CTMP. Alternatively, more sustainable, modes for the transportation of freight are being considered e.g. rail and water.
Humber Local Energy Strategy (2020) (Ref 16.13)		The Yorkshire and Humber is currently one of the most carbon intensive regions in the UK and represents the greatest opportunity for decarbonisation. The Humber Local Energy Strategy (2020) recognises this and identifies three objectives to ensure the Humber region supports the UK’s commitment to reduce emissions by 80 per cent by 2050. These include: • Securing the energy value through efficiency improvements, new technologies and shift to low carbon and renewable sources. • Developing the hydrogen economy. • Moving to a net-zero emissions with the application of Carbon Capture, Use and Storage.	The Project supports the objectives of the Humber local energy strategy by providing essential infrastructure required for the transportation of Carbon dioxide from emitters across the Humber region to safe and secure storage under the North Sea.
North Yorkshire Local transport plan (LPT4) 2016-2045 (Ref 16.14)	Objective 3d – Network Management	Objective includes commitments by North Yorkshire County Council to: • Ensure that planned and unplanned activities on the highway network are managed to minimise congestion and disruption of traffic flows; and	The Traffic and Transport assessment in the PEIR identifies if there are disruptions / impacts on the network in line with IEMA guidance thresholds. An in-depth analysis of the potential implications on the transportation of materials, goods and personnel to and from the Project

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		Keep traffic moving by aiming to minimise congestion and disruption on the highway network	can impact the local traffic conditions, road safety and the capacity of the road network will be undertaken and reported in the ES. This will also consider the cumulative effects of the Project along with other planned development and infrastructure projects. Appropriate mitigation measures to mitigate and minimise the identified impacts will be identified within the ES and Outline CTMP.
North Yorkshire Abnormal loads and weight limits (Ref 16.15)		Contains advice regarding Abnormal loads and weight limits includes advice on transporting abnormal loads on North Yorkshire roads and the steps that should be followed to notify the council. Hauliers and crane operators must give a minimum of two days' notice to the highway authority and bridge owners before moving an abnormal load. If any vehicle or vehicle combination has a gross weight greater than 80 tonnes, hauliers must give a minimum of five days' notice. Annually, the haulier should provide a form of indemnity which indemnifies the Council in respect of any damage that is caused during any journey for which the Council have been notified. The haulier may then go ahead with the proposed movement unless contacted by the abnormal loads officer, who will suggest that an alternative route be taken and will be able to supply specific information about bridge height and weight restrictions.	Notice and permissions required for the transportation of abnormal loads will be detailed within the Outline CTMP, including the notification to the council of any damage caused during the journey. The Outline CTMP will be discussed and agreed with NH, LHAs and Police.

Guidance

16.2.4 The Traffic and Transport assessment has been carried out in accordance with the following guidance:

- Transport Evidence Bases in Plan Making and Decision Taking (Ref 16.16) is to help local planning authorities assess and reflect strategic transport needs in Local Plan making. This guidance highlights the information required and what information needs to be considered when undertaking a transport assessment.
- Travel Plans, Transport Assessments and Statements (Ref 16.17). This guidance provides support regarding Travel Plans, Transport Assessments, and Transport Statements relating to decision-making. This guidance outlines when these documents are required, in addition to what each of these should contain. Travel Plans, Transport Assessments and Statements assess and mitigate the transportation impacts arising from development projects. Assessments should be based on normal traffic flow and usage conditions, although it may be required to consider the implications of peak traffic flows. Any projections should use local traffic forecasts.
- Water Preferred Policy: Guidelines for the Movement of Abnormal Indivisible Loads (Ref 16.18). This guidance outlines when to move abnormal loads by water, and when it is permitted for it to be moved via road. The document highlights that where it is practical, economic, and environmentally suitable to do so, abnormal loads should be moved by inland and / or coastal water to reduce the impact which would arise via load movement by roads.
- The Design Manual for Roads and Bridges (DMRB) LA 104 Environmental Assessment and Monitoring (Ref 16.19). This document outlines the requirements for environmental assessments of projects, which includes the reporting and monitoring of significant environmental effects. The assessment of environmental effects, reporting of assessments and monitoring of environmental effects, aligns with the requirements of the Directive 2011/92/EU as amended by 2014/52/EU 2014/52/EU.
- Environmental Assessment of Traffic and Movement, Institute of Environmental Management and Assessment (IEMA) ('IEMA Guidelines') (Ref 16.20). The guidelines are for the assessment of the environmental impact of road traffic associated with major new development. The objective is to provide the basis for a systematic, consistent and comprehensive coverage for the assessment of traffic impacts arising from development projects. A checklist is provided containing the environmental

effects which includes traffic noise, disruptions, pedestrian and cyclist impacts, and accidents and safety.

- Strategic road network and the delivery of sustainable development (Ref 16.21). The guidance sets out how developments can interact and minimise impact on the SRN.

16.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 16.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined below.

Table 16-4 – Summary of Scoping Opinion relevant to Traffic and Transport

Section Reference	Matter	Comments	Response
ID 3.14.3	To be scoped out of the MA&D chapter and included in Traffic and Transport: Construction traffic accidents	The assessment of Construction traffic accidents is included in Chapter 16 – Traffic and Transport	An initial review of the latest personal injury collision data along the construction primary access routes is provided within the PEIR within Section 16.5. An assessment on road safety will be undertaken and presented within the ES along all roads forming the Construction Access Routes. The locations of all collisions indicated in the reviewed data are shown in Figure 16.3.
ID 15.4.1	The Scoping Report states that marine vessel traffic associated with the landfall installation would not be considered in the ES as it would be covered by the offshore pipeline consent.	The Inspectorate considers that all potential impacts from works to be consented via the DCO should be identified and assessed within the ES. No information has been provided as to the likely number of vessel movements that would arise from works to be consented via the DCO. The ES should confirm the worst-case number of vessel movements. If it can be confirmed and evidenced that the works from the Proposed Development would not disrupt navigation or generate vessel movements that could impact on marine navigation, the Inspectorate is content this matter can be scoped out. However, if such assurances cannot be provided, the Inspectorate considers this matter should be assessed within the ES, with particular consideration of potential cumulative effects.	Noted. A summary of vessel movements in relation to the Project has been considered within this chapter. Given the extensive study undertaken in relation to the Offshore Environmental Statement, cross reference has further been provided to this study, where relevant. Given the nearshore nature of the Project and associated impact pathways, minimal impacts with respect to marine traffic disruption is foreseen. This assessment is contained within this chapter and will also be presented / updated in the ES.
ID 3.11.2		The applicant proposes to scope out operational traffic on the basis that it would be infrequent and would not have a material effect on the transport network and receptors. Subject to confirmation within the ES that anticipated operational vehicle movements do not exceed relevant thresholds for increase in traffic levels (i.e. IEMA Rule 1 and Rule 2 detailed in Table 15-5), the Inspectorate agrees that significant effects are unlikely and that an assessment of effects can be scoped out of the ES. If such confirmation is not possible, an assessment should be provided. The ES should also demonstrate that cumulative vehicle movements with other developments would not exceed relevant thresholds.	Noted. The assessment of the likely effects as a result of cumulative vehicle movements with other developments will be presented within the ES.

Section Reference	Matter	Comments	Response
Table 15-8		The Scoping Report states that decommissioning traffic flows for the removal of the AGIs and Pump Facility are anticipated to be significantly less than those for the construction phase and as the pipelines would be left in situ. The Inspectorate acknowledges the construction phase assessment would likely represent a worst-case scenario and therefore agrees that no further detailed assessment is required for the decommissioning phase. However, this should be clearly explained within the ES to demonstrate that the decommissioning phase has not been overlooked.	Noted. The ES will provide further details on decommissioning activities and confirmation on associated vehicle movements.
Table 15-6		Table 15-6 indicates that two levels of significance are possible as a result of certain combinations of impact magnitude and receptor sensitivity. In these cases, the ES should clearly detail how the final level of significance has been determined and provide justification for not adopting the worst-case level of significance from the options available. Where professional judgement is used to determine whether an identified effect is significant or not significant, this decision should be supported by clear reasons and evidence and make reference to any relevant guidance.	Noted. The ES will clearly detail how the final level of significance has been determined providing valid justification for the level identified. Where professional judgement is used in the assessment, this will be supported by evidence of reason and supported by best practice, guidance where available, and criteria successfully used on similar NSIP projects.

Summary of Engagement

- 16.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 16-5 below.

Table 16-5 – Summary of Stakeholder Engagement relevant to Traffic and Transport

Consultee	Date and method of engagement	Summary of Issues Raised	Response
North Lincolnshire Local Highway Authority	The Construction Access Routes were presented and discussed on an online meeting held on the 5 th of August 2025. LHA to review shared routes internally and formally provide written feedback.	Summary of Response: Identified a sensitive receptor along the section of the route via South Ferriby. Highlighted that the sensitive nature of this sensitive receptor (South Ferriby Primary School) would need to be taken into consideration. Advised that if the one-way system (in via Ferry Road, exit via East Halton), Chapel Field / Soff Lane should still be avoided by cars / LGV construction traffic. Suggested to use Town Street instead of using East Halton Road / Greengate Lane to access the access points on Staple Road as this would be a more direct route from the A160 and would reduce number of receptors. Shared concerns over the secondary route via Keadby as there are known issues which arose from Keadby 2. Expressed concerns on a number of bends along the construction route and the movement of construction traffic	These issues have been noted and will be addressed in the ES and outline Construction Traffic Management Plan. Appropriate mitigation measures will be identified in the ES and outline Construction Traffic Management Plan to mitigate the impact of construction traffic movements on sensitive receptors. For example, where the Construction Access Routes pass in close proximity to schools, mitigation can be implemented to restrict construction HGV traffic movement during school drop-off and pick-up times. It has been noted that if the one-way system (enter via Ferry Road, exit via East Halton) is the Construction Access Route, anticipated that no construction traffic will be routed via Chapel Field Lane / Soff Lane. Where issues identified involving bends in the carriageway, swept path analysis will be undertaken to establish whether the largest anticipated vehicle to use the route is able to safely travel along these sections. This will be addressed in the outline Construction Traffic Management Plan (CTMP).
East Riding Local Highway Authority	The Construction Access Routes from section to the west of the Humber were presented and discussed on an online meeting held on the 11 th of August 2025.	Summary of Response: Section through Reedness / Whitgift / Ousefleet has been identified as narrow. However, if this is necessary for cars and / or Large Goods Vehicles (LGVs) LGVs due to access problems via Keadby, the route should be useable. Highlighted concerns based on the local residents for usage along Reading Gate. Noted a school located along the construction route which goes through Swinefleet.	If the Minor Access Route via Keadby is not useable, the routeing via Reedness / Whitgift / Ousefleet will be reviewed. Swept path analysis will be undertaken for the anticipated largest vehicle required and appropriate mitigation measure will be identified. The route via Reading Gate is a Minor Access Route, meaning that it will predominantly be used by cars / LGVs. However, this route will be reviewed to determine whether it is necessary to be included as part of the Project. Appropriate mitigation measures will be identified in the ES and outline Construction Traffic Management Plan to mitigate the impact of construction traffic movements on sensitive receptors.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
			For example, where the Construction Access Routes passes in close proximity to schools, mitigation can be implemented to restrict construction HGV traffic movement during school drop-off and pick-up times.
	The Construction Access Routes to the north of the Humber were presented and discussed on a team's meeting held on the 20 th of August 2025.	Summary of Response: Officers raised the possibility of a new development (enterprise park) accessing onto Paull Road but mentioned this would not be imminently. Officers noted an issue at the junction with the A1033 where vehicles park on the side of the road and traffic flow is reduced. Normally an issue in the evenings and therefore may not affect the Project. Officers confirmed Bellcroft Lane has heave and settlement issues, and that there will be a scheme to better the road in the future, but not this financial year. Officers suggested the lane that runs from Holmpton – Holmpton Road – Patrington – chipping dump is not in good condition, but that there are no other options – lane also known as 'Snakey Lane'. Officers suggested a check of the road width through Wheaton to the A112 to confirm construction traffic would have enough width but noted that there may have been passing places installed by the windfarm companies. Officers suggested there may be some pushback from villages if we are to go through the centre, particularly Ottringham and Patrington.	Cumulative impact will be undertaken within the ES, which will include a review and assessment of other development flows which coincide with the Project peak flows along the Construction Access Routes. Parking issues affecting road width / traffic flow will be taken into consideration in the Outline CTMP. This has been noted. This has been noted and will be taken into consideration in the Outline CTMP. This has been noted and will be taken into consideration in the Outline CTMP. This has been noted and will be taken into consideration in the Outline CTMP.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
National Highways	The Construction Access Routes were presented and discussed on a team's meeting held on the 19 th of August 2025.	Summary of Response: M62/J36 south of the River Ouse - Two planning applications for the Freeport site in this area (24/03600/STPLFE and 24/01608/STOUTE). NH have agreed to review the list of developments to be considered in the cumulative assessment. M180/J2 west of the River Trent (Ealand/Keadby/Crowle) - Noted Lincolnshire Lakes development/planning application (PA/2023/1474) will add traffic to this area and should be considered in cumulative assessment. NH felt this should be factored into the future baseline. M180/J3 east of the River Trent - Lots of construction activity here also, and closest section to the Lincolnshire Lakes development. This section will be detrunked following the Lincolnshire Lakes development (and this should be in place by the time HCCP is on site). A160 and M180, West of the Humber - NH noted there are various planning applications in this area – they will take a further look at this location and provide follow up comments. • M180 Barnetby junction – lots of development here • M180 includes a scheme to replace concrete surface with new tarmac. Not yet programmed. • A160 – high flows of HGV at the signalised junction near the refinery. A1033 Salt End Roundabout - Various planning applications in this area and works expected at this roundabout when the development around this comes forward. The junction threshold in terms of traffic increases would need to be reviewed on a case-by-case basis depending on the sensitivity of the junction and the likely estimated increases from the Project and cumulative assessment.	Cumulative effects assessment will be undertaken and reported in the ES; the assessment will include a review and assessment of other development flows which coincide with the Project peak flows along the Construction Access Routes. A List of developments to be considered in the cumulative assessment will be shared for NH to review. As per above. As per above. As per above. As per above. As per above. Additionally, peak traffic flow numbers will be shared with NH to determine whether the traffic increases would trigger a junction capacity assessment.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
North Yorkshire Local Highway Authority	The Construction Access Routes were presented and discussed on a team's meeting held on the 21 st of August 2025	Summary of Response: Officers noted subsidence on A645 but highlighted no other specific concerns with the routes proposed. Officers raised possibility of conditions surveys being needed. Officers noted the possibility of pushback from residents and queried the consultation strategy for the Project. Officers emphasised that the Project should be liaising with village and parish councils to minimise disruption Officers drew attention to a new 200-home development on Mill Lane in Carlton.	This has been noted. This has been noted. Consultation will be undertaken with residents / communities. Within the ES and Outline CTMP, mitigation measures will be outlined The Project has and will continue to liaise with Parishes as part of an overall consultation strategy. Within the ES and Outline CTMP, mitigation measures will be outlined such as ensuring a community liaison officer is put in place. Cumulative impact will be undertaken within the ES, which will include a review and assessment of other development flows which coincide with the Project peak flows along the Construction Access Routes. List of developments to be considered in the cumulative assessment will be shared with North Yorkshire Highway Authority to review.
Maritime and Coastguard Agency	Written response in 2024	Summary of written response: Note on this occasion that the Project will cross multiple rivers which are navigable, and works may have an impact on other marine users during the construction, operation and decommissioning phases. Works may be undertaken on the coast at Easington to connect the onshore pipeline to the offshore infrastructure as part of the wider East Coast Cluster, which is understood to be being consented through other legislation and is outside the scope of this Project. The MCA would expect the applicant to confirm the extent of construction works undertaken below the Mean High-Water Springs for the onshore works over the rivers and on the east coast at Easington. The MCA would expect any impact on shipping and navigation to be assessed by the applicant and any works in the marine environment to	A summary of vessel movements in relation to the Project has been considered within this chapter. Given the extensive study undertaken in relation to the Offshore Environmental Statement, cross reference has further been provided to this study, where relevant. Given the nearshore nature of the Project and associated impact pathways, minimal impacts with respect to marine traffic disruption is foreseen. This assessment is contained within this chapter and will be updated and reported in the ES. A full marine Navigation Risk Assessment is not foreseen to be a requirement here due to the limited potential for significant impacts.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		be subject to the appropriate marine licensing regime before carrying out any marine licensable works. The location of the works onshore which cross the River Trent and the River Humber (for example) may also fall within the jurisdiction of a Statutory Harbour Authority (SHA) and therefore they are responsible for the safety of navigation within their waters. The SHA should therefore be consulted on any plans for works within their waters. The MCA would like to ensure that the worst-case scenario for shipping and safe navigation is considered going forward and depending on the scale of the works a proportionate Navigation Risk Assessment, in accordance with the International Maritime Organisation Formal Safety Assessment Process, should be considered.	

16.4 Assessment Methodology

Baseline Data

Study Area

- 16.4.1 The Study Area for Traffic and Transport includes all roads included within the Construction Traffic Routes to and from the Project, up to the SRN. The Study Area comprises the area within a 150 m radius from those roads to ensure all receptors are considered, including Public Rights of Way (PRoW), within the draft Order Limits.
- 16.4.2 A number of construction site access points were initially identified. These, alongside the Construction Traffic Routes, are presented within Volume 3 - Figure 16.1. Additional details about these access points and the Construction Routes are presented in Section 16.5.
- 16.4.3 Construction routes have been split into:
- Primary Access Routes (PARs) – To be used as the primary access route (in combination with the pipeline construction corridor haul road) for HGV movements associated with pipeline construction activities, in addition to LGVs / cars.
 - Secondary Access Routes (SARs) – HGV and LGV / car access routes retained to be used as an alternative, or in addition to primary access routes to cover potential changes from the base case design, such as a change in crossing methodology, a potential Lockout is confirmed as such, or access through a private road is not obtained. Note that these may also act as minor access routes as defined below.
 - Minor Access Routes (MARs) – To be used for LGV / car traffic, as well as some HGV traffic in pipeline construction, and trenchless crossing construction activities. Minor access routes generally follow single lanes or roads with a notable impact on nearby villages and towns and sensitive receptors. These roads are poorly suited for large volumes of HGV traffic but may be used in a supporting role to major access routes, such as to reduce haulage of materials along the construction corridor or to reduce reliance on the construction corridor haul road to trenchless crossing compounds.
 - Private Road / Track (PRARs) – Private roads to be used for HGV, LGV and car vehicle movements.

Baseline Data Collection

Desk Study Sources

- 16.4.4 Baseline conditions of the Project were established during a desktop study using the following sources:
- DfT counts along the Construction Access Routes to obtain reference Average Annual Daily Traffic (AADT) flows (Ref 16.22).
 - TEMPro (Trip End Model Presentation Program) software (Ref 16.23).
 - DfT, Road traffic statistics - Table TRA0307 flows (Ref 16.24).
 - DfT, Road traffic statistics - Road collisions (STATS19 database) latest three-year period 2021-2023 (Ref 16.25).
 - Information about height and width restrictions across the Construction Access Routes using desktop assessment and on-site observations.
 - Information about pedestrian and cycle facilities along the Construction Access Routes using desktop assessment and on-site observations.
 - Public transport information obtained from East Riding of Yorkshire Council, North Lincolnshire Council, North Yorkshire County Council and Lincolnshire County Council websites.
 - Public Right of Way (PRoW) maps obtained from East Riding of Yorkshire Council, North Lincolnshire Council, North Yorkshire County Council and Lincolnshire County Council websites.
 - Aerial mapping.
 - National Cycle Routes from the Sustrans website (Ref 16.26).
- 16.4.5 Following engagement with NH and the LHAs, the EIA assessment will also consider additional data / sources, including:
- Committed development schemes in the affected local authorities to capture potential traffic growth along the preferred construction routes, obtained from relevant planning authorities.
 - Committed and planned transport schemes along and in the vicinity of the preferred construction routes.
 - Committed transport schemes along and in the vicinity of the Construction Access Routes.

Site Visits and Surveys

- 16.4.6 The following surveys have been undertaken to date:
- Automatic Traffic Count (ATCs) surveys commissioned to establish existing baseline traffic flows along road links that do not have DfT counts, where required.
- 16.4.7 Future engagement with NH and LHAs, following statutory consultation may result in additional data and data sources for the EIA assessment. This could include:
- ATC and Manual Classified Count (MCC) surveys commissioned to establish existing baseline traffic flows along road links that do not have DfT counts, where required.
 - Surveys along PRoW affected by the Project to gather information of the existing usage.

Impact Assessment Methodology

- 16.4.8 This section sets out the scope and detailed assessment methodology that would be used to assess the Traffic and Transport impacts during the construction phase of the Project. The following methodology and assessment criteria have been developed using The DMRB LA 104 Environmental Assessment and Monitoring (Ref 16.19) and IEMA Guidelines (Ref 16.20) guidelines and take into account relevant policies and legislation.
- 16.4.9 The proposed methodology is broadly based on assessment criteria developed for similar major infrastructure projects.
- 16.4.10 The assessment will examine a robust case in terms of Traffic and Transport impacts and effects, i.e. the peak period when the highest levels of construction traffic are expected to occur. It would be informed by a desk-based study, and discussions with the design team, particularly around anticipated construction traffic movements and proposed mitigation measures.
- 16.4.11 For road users, the following rules taken from the IEMA Guidelines (Ref 16.20) are used to define the scale and extent of the assessment:
- Rule 1: Include highway links where the total traffic flows are predicted to increase by more than 30% (or where the number of HGV is predicted to increase by more than 30%).
 - Rule 2: Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

- 16.4.12 Increases below 10% are generally considered insignificant given that daily variations in background traffic flow would usually fluctuate by this amount. Therefore, changes in traffic flow below this level are assumed to result in no discernible environmental impact.
- 16.4.13 Where Rule 1 and Rule 2 would apply, the following potential environmental impacts on 'existing road users' would be considered and likely would need to be addressed:
- Severance (reduced ability for pedestrians, cyclists and where relevant horse-riders to crossroad links).
 - Vulnerable users delay (changed journey times and distances for pedestrians, cyclists and where relevant horse-riders).
 - Public transport users and driver delay (changed journey times and distances for private and commercial vehicle occupants and for public transport users).
 - Pedestrian, cycle and horse-rider amenity (loss of amenity for vulnerable road users).
 - Fear and intimidation (fear and intimidation issues for pedestrians, cyclists and horse-riders due to increased traffic flows and change in composition).
 - Accidents and safety (reduction in road safety for all road users).
 - Hazardous loads.

Sensitivity

- 16.4.14 Resources are the assets and facilities which may be affected by the Project such as the highway network. Receptors are the users or beneficiaries of those resources such as pedestrians, cyclists and drivers who travel within the Study Area. This would include the areas along the highway routes that could be sensitive to changes in traffic volumes. Sensitive areas are defined by the presence of sensitive receptors and inadequate facilities, such as community centres, schools, horse-rider facilities, narrow well-used footways along busy roads or collision black spots.

The criteria used to determine the value and sensitivity of receptors specific to Traffic and Transport are set out in

16.4.15 Table 16-6. These values are based on the IEMA Guidelines (Ref 16.20).

Table 16-6 Criteria for Determining Value / Sensitivity

Sensitivity / Value	Resource	Receptor
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, collision blackspots, retirement homes, urban / residential roads without footways that are used by pedestrians Marine traffic: Very low or no capacity to accommodate the proposed form of change; and / or receptor designated and / or of international level importance. Likely to be rare with minimal potential for substitution. May also be of very high socioeconomic importance.	Residents, workers, pedestrians (sensitive groups such as children, elderly and disabled), cyclists and horse-riders using the highway, fishing vessels, commercial shipping and recreational vessel traffic.
Medium	Traffic flow sensitive receptors including congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycleways, community centres, parks and recreational facilities. Marine traffic: Moderate to low capacity to accommodate the proposed form of change; and / or receptor designated and / or of regional level importance. Likely to be relatively rare. May also be of moderate socioeconomic importance.	Residents, workers, pedestrians (sensitive groups such as children, elderly and disabled), cyclists and horse-riders using the highway, fishing vessels, commercial shipping and recreational vessel traffic.
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision.	Residents, workers, pedestrians (sensitive groups such as children, elderly and disabled), cyclists and horse-riders using the highway, fishing

Sensitivity / Value	Resource	Receptor
	Marine traffic: Moderate to high capacity to accommodate the proposed form of change, and / or receptor not designated but of district level importance.	vessels, commercial shipping and recreational vessel traffic.
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions. Marine traffic: High capacity to accommodate the proposed form of change; and / or receptor not designated and only of local level importance.	Residents, workers, pedestrians (sensitive groups such as children, elderly and disabled), cyclists and horse-riders using the highway, fishing vessels, commercial shipping and recreational vessel traffic.

Magnitude of Effect

- 16.4.16 The expected traffic generated by the Project during construction has been quantified where appropriate and assessed against anticipated background traffic flows to outline the anticipated percentage increase in total vehicles and HGV.
- 16.4.17 The methodology proposed for determining the magnitude of impact broadly follows the guidance set out by the DMRB LA 104 (Ref 16.19) shown in Table 16-7. This shows that where there is little change to baseline conditions the magnitude of impact would be negligible. Where baseline conditions would notably change (e.g., as a result of a high volume of construction traffic on a road link), this would constitute a major magnitude of change.

Table 16-7 – Magnitude of Change (Impact) Categories

Magnitude of Change	Change from Baseline
Major	Total loss or major alteration to key elements or features of the baseline conditions to the extent that post-scenario character or composition of baseline conditions would be fundamentally changed.
Moderate	Loss or alteration to one or more key elements or features of the baseline conditions to the extent that post-scenario character or composition of the baseline conditions would be materially changed.
Minor	Minor shift away from baseline conditions. Changes arising would be detectable but not material; the underlying character or composition of the baseline conditions would be similar to the pre-scenario situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation.

The magnitude of impact (change) for each assessment criteria for Traffic and Transport is set out in

- 16.4.18 Table 16-8 sets which follows IEMA Guidelines (Ref 16.20) and the same principle as Table 16-7 above. This assessment will be undertaken in the ES for routes exceeding the threshold criteria.

Table 16-8 – Assessment of Environmental Effects and Magnitude of Impact

Significance	Assessment
Driver delay and public transport delay to passengers	Where there is a change in traffic flow of greater than 30%. Net traffic and / or HGV flows of 30%, 60% and 90% are considered minor, moderate and major changes in magnitude. Changes to bus services / bus stops or taxi facilities for over four weeks in any 12-month period.
Pedestrian, Cyclist and Horse-Rider Delay, Severance and Amenity	Where there would be a temporary maximum increase in journey length along a road or other PRow for pedestrians, cyclists or horse-riders for more than four weeks in any 12-month period; Pedestrian severance occurs when there is difficulty experienced in crossing a heavily trafficked route. Changes in net traffic flows of 30%, 60% and 90% are considered to have a minor, moderate and major effect in severity respectively. The pedestrian amenity threshold, as set out in the IEMA Guidelines (Ref 16.20) to assess the significance of change, is where the traffic flow is doubled (increase over 100%) or where the HGV flows are over 30%, 60% and 90% (considered to have minor, moderate, and major effects respectively). Pedestrian amenity is defined as the relative pleasantness of a journey and is affected by traffic flow, traffic composition and footway width / separation from traffic. Where a temporary increase is forecast of more than 30% in lorries or total flow on a route intersecting a PRow, bridleway or near an horse-rider centre for more than four weeks in any 12-month period. Changes in net traffic flows of 30%, 60% and 90% are considered to have a minor, moderate and major effects in severity respectively. Changes in the volume, composition or speed of traffic may affect the ability of people to cross roads. In general, increases in traffic levels are likely to lead to greater increases in delay. Pedestrian, cyclist and horse-rider delay has been deemed to occur when there is difficulty experienced in crossing a heavily trafficked route. Changes in net traffic flows of < 30%, 30 to 60%,

Significance	Assessment
	60 to 90% and > 90% are considered to have negligible, minor, moderate and major impacts respectively. The magnitude of impact considered for the pedestrian, cyclist and horse-rider delay depend on the journey length increase as defined in the DMRB LA 104 Environmental Assessment and Monitoring. An increase of more than 500 m is major, between 250 and 500 m is moderate, between 50 and 250 m is minor and under 50 m is negligible. The magnitude of the impact is adjusted based on the duration of the impact, if the temporary increase in journey length along a road or other PRow is less than four weeks in any 12-month period.
Fear and intimidation	Fear and intimidation occur through a combination of traffic flow, speed, HGV composition and its proximity to people or lack of protection caused by such factors as narrow pavements. The assessment will be based on the sensitivity establish for the WCH Amenity and severance and a weighting system defined in the IEMA Guidelines (Ref 16.20) Environmental Assessment of Traffic and Movement. This weighting system is based on the average hourly traffic flow, 18-hour heavy vehicle flow and average speed over an 18-hour day. The degree of hazard will be assessed with reference to the established thresholds, and a score provided for each combination on a highway link under consideration. The total score from all three elements (traffic levels, speed, and HGV composition) is combined to provide a 'level' of fear and intimidation for all three elements (Small, Moderate, Great, Extreme).
Collisions and road safety	Collisions and safety will be assessed using three-year personal injury collision data obtained from online DfT Road Collision Data for the roads and junctions on the Construction Access Routes. The IEMA Guidelines (Ref 16.20) recommend that professional judgement is needed to assess the effects. The following criteria will be used to identify collision clusters: • Where junctions have had ten or more collisions in a three-year period; or

Significance	Assessment
	Where links have recorded ten or more collisions per 100m lengths in a three-year period. The collision data will be analysed along the full length of the links to identify patterns in collision locations in order to establish any areas of safety concerns. This will include a comparison with national statistics.

Significance

- 16.4.19 Significance of effect will be derived by considering the sensitivity (or value) of the receptors within the Study Area, and the magnitude of change (impact) likely to be caused by the activities of the Project. These factors are combined to give an overall significance of effect as set out in Table 16-9 below, which is based on DMRB LA 104 Table 3.8.1 (Ref 16.19). This has been supplemented by professional judgement which, where applicable, has been explained to give the rationale behind the values assigned. Likely significant effects, in the context of the EIA Regulations, are considered to be effects of moderate or greater significance.

Table 16-9 – Significance Matrix

Sensitivity of Receptor	Magnitude of Impact			
	Major	Moderate	Minor	Negligible
High	Large	Large or Moderate	Slight or Moderate	Slight
Medium	Large or Moderate	Moderate	Slight	Neutral or Slight
Low	Slight or Moderate	Slight	Slight	Neutral or Slight
Negligible	Slight	Neutral or Slight	Neutral or Slight	Neutral

Assumptions and Limitations

- 16.4.20 The following assumptions and limitations are applicable to the preliminary assessment reported in this chapter:
- Construction traffic forecasts are based on an initial high-level estimate of construction materials and programme and are considered to provide a reasonable worst-case scenario for peak activity. However, at this preliminary stage, construction access points, and anticipated construction activities associated with the Project is still subject to change. Therefore, as the Project progresses and the construction traffic and programme becomes available, a full Traffic and Transport assessment will be undertaken and reported in the ES.

- It is anticipated that all construction traffic would access the Project's draft Order Limits from the Primary Access Routes (PAR) along the local highway network. The Primary Access Routes would connect to the SRN and Major Road Network (MRN), i.e. those routes between major settlements and ports / airports across Great Britain.
- Several assumptions have been made when forecasting the traffic generation of the Project during construction. These forecasts have been developed based on professional judgement and derived from experience with other developments similar in size, scale and nature to the Project.
- To assess the worst-case construction traffic movements per road Link, the possibility of SARs being used as an alternative to the PARs has been taken into consideration. The SARs would be used as an alternative, or in addition to primary access routes to cover potential changes in from the base case design, such as a change in crossing methodology, a potential Lockout is confirmed as such, or access through a private road is not obtained.
- As with all types of assessment, the assessment depends on the accuracy of data provided by third parties. It has therefore been assumed that data provided by third parties is accurate at the time of this preliminary assessment.
- Receptor sensitivity values applied to road segments and PRow have been based on a desk study of network characteristics and land-use within a 150 m catchment of each location.
- Due to the Project programme, traffic surveys were undertaken in what is considered a non-neutral month when traffic flows are considered to be the most representative of 'average conditions. However, surveys conducted outside these periods still may reflect typical weekday and commuter traffic without significant distortions if undertaken away from tourism or seasonal events.
- On roads where the increase in traffic flow compared to the future baseline may result in a predicted increase that would be higher than the two rules set out in the IEMA Guidelines: EATM (2023) further assessment will be undertaken within the ES. However, it is important to consider any overall increase in road traffic in relation to the capacity of the road, including receptor sensitivity.
- With regards to cumulative effects from nearby committed developments, historical traffic data will be included in the assessment by using TEMPro growth factors. This would account for background traffic growth between the various traffic data survey dates and the traffic model years. The TEMPro database accounts for all background development in the Local Plan in the vicinity of the Study Area and covers all committed

development schemes. Therefore, the assessment is inherently cumulative as these schemes will be accounted for and no additional effects are anticipated. However, if there are any approved developments that are likely to use the same construction routes and overlap the peak construction activity, these will be identified and may need to be assessed. These will be agreed with the Local Authorities, and a cumulative effects assessment will be undertaken and reported in the ES if required.

- An assessment has been undertaken to identify the percentage increase in HGV and in total traffic because of construction traffic on the LRN using future baseline traffic flow data. Due to the extensive construction programme, each road link comprising the PARs may experience peak activity during a different month. The predicted increase has been assessed against 12-hour weekday flows (07:00 to 19:00) throughout the construction period.
- Some construction operations may take place outside of the core working hours, for example deliveries by Abnormal Indivisible Loads (AILs).
- The trip generation for construction traffic forecasts is based on the assumption that all vehicles travelling to the site would leave the site on the same day. This equates to one vehicle making two movements on the PARs (one in each direction) except where one-way working has been identified.
- The marine traffic assessment is based on the best available information at the time of writing, with vessel density based on annual averages from 2017 to 2023.

16.5 Baseline Conditions

Existing Baseline

Construction Traffic Route Roads and Junctions

- 16.5.1 It is anticipated that all construction HGV traffic would access the Project sites from the SRN. Table 16.1 – 1 contained in Volume 4 - Appendix 16.1 identifies SRN junctions and access points that would be used by construction traffic. These access points are shown on Volume 3 - Figure 16.1.
- 16.5.2 The Construction Access Routes between the SRN and construction access points were developed using the following considerations where applicable:
- Use of the shortest route from the location of access points to the SRN.
 - Use of A roads as a priority, then B roads, then C roads and then unclassified roads.

- Avoidance of single carriageway roads unless these provide direct access to a construction site.
- Avoidance of settlements and sensitive receptors such as schools and other high-risk locations to minimise the impact on villages and towns and sensitive road users.
- To incorporate and account for input and feedback provided to date as part of landowner and local authority engagement.
- Avoiding existing highways containing constraints such as weight restricted bridges or low bridges.
- Avoiding existing highways within local highways authority weight restriction areas as far as is reasonably practicable.
- Avoiding dangerous or poorly suited intersections.
- Ensuring there is at least one viable HGV access route to each access locked section of the pipeline construction corridor.

- 16.5.3 As outlined in the Transport and Logistics Report (NS051-PL-REP-527-00009 rev B03) the final design and location of all site accesses will be agreed prior to the start of construction at each access point. When an access point is in use, a Temporary Traffic Regulation Order for a 30-mph speed limit may be requested at access locations where the existing speed limit is above 30mph; the extent of each restriction will vary at each access based upon the existing speed limit, road alignment, road geometries and forward visibility. Each access will meet appropriate visibility and design standards. Additional traffic management measures may be required at some accesses.
- 16.5.4 Additionally, the Transport and Logistics Report (NS051-PL-REP-527-00009 rev B03) identifies notable locations along the construction route which explains the alternative route options to the Primary Access Routes, using the Secondary Route Access Routes.
- 16.5.5 The Construction Access Route used for each access point is shown below in Table 16.1 – 2 contained in Volume 4 - Appendix 16.1. The Construction Access Routes are shown in Volume 3 - Figure 16.1.
- 16.5.6 The extent of the highway within the Study Area covered in this section includes roads and road links that would be used by construction traffic to access the Project. In order to facilitate the assessment of potential impacts on receptors and road users along the Construction Access Routes, where roads share similar characteristics, they were combined into one road link for the purpose of the Traffic and Transport assessment.

16.5.7 The Construction Access Routes are summarised in Volume 4 - Appendix 16.1: Table 16.1 – 3 to Table 16.1 - 10 and provides a description for the Primary Access Routes (PARs), Secondary Access Routes (SARs), Private Road Access Routes (PRARs), and Minor Access Routes (MARs).

16.5.8 These roads are illustrated on Volume 3 - Figure 16.1.

Public Rights of Ways

16.5.9 As noted in the PRow Diversion Schedule (NS051-PL-SCH-527-00003. Rev A01) there are numerous PRow within the draft Order Limits that have the potential to be impacted during construction and may require diversions. Additionally, there are numerous PRow connecting to the Construction Access Routes. These PRow include footpaths used by pedestrians, and bridleways used by pedestrians, cyclists and horse-riders.

16.5.10 Details regarding the impact of the Project within the Order Limits on the PRow, the diversion method, and the duration of impact is contained within Appendix A of the PRow Diversion Schedule (NS051-PL-SCH-527-00003. Rev A01). The impact of PRow connecting to the Construction Access Routes will be taken into consideration in the ES.

16.5.11 The existing PRow are shown in Volume 3 - Figure 16.1.

Traffic Flows

16.5.12 Where available, traffic flows have been obtained from the DfT's static traffic counters for road links forming the Construction Access Routes. The DfT static traffic counter sites are identified on Volume 3 - Figure 16.1.

16.5.13 An appropriate growth factor derived from TEMPro (Ref 16.23) was applied to the traffic flows to account for growth in background traffic between the year the surveys were undertaken and future baseline year.

16.5.14 The resultant AADT flows were converted into average weekday traffic flows and 12-hour flows (07:00-19:00 hrs) by applying an appropriate factor. This factor was derived from a standard daily traffic profile from the DfT's online road traffic statistics Table TRA0307 (Ref 16.24).

16.5.15 For links that do not have available or recent DfT traffic flows, ATC surveys were undertaken in 2022 and 2025. Additionally, North Lincolnshire County Council provided traffic flows for Ferry Road / Thornton Road.

- 16.5.16 For Private Access Roads, and roads which do not connect to any settlements or places of interest, it has been assumed that there are zero flows.
- 16.5.17 The baseline traffic flows for the Construction Access Roads are shown in Volume 4 - Appendix 16.1: Table 16.1 – 11, Table 16.1 – 12 and Table 16.1 – 13.

Sensitive Receptors

- 16.5.18 Sensitive receptors within a 150 m radius have been identified for all Construction Access Routes and have been summarised within Volume 4 - Appendix 16.1: Table 16.1 – 14, Table 16.1 – 15, Table 16.1 – 16 and Table 16.1 – 17.
- 16.5.19 Sensitive receptors for all Construction Access Routes are also shown in Volume 3 - Figure 16.2.

Collision Data

- 16.5.20 Personal injury collision data has been obtained from DfT Road Safety Data (Ref 16.24) for the roads along the Construction Access Routes. An initial review of the latest three-year personal injury collision data (2021-2023) has been summarised in Volume 4 - Appendix 16.1: Table 16.1 – 19, Table 16.1 – 21, Table 16.1 – 23, and Table 16.1 – 25.
- 16.5.21 For the roads and junctions on the Construction Access Routes, the locations of all collisions are shown on Volume 3 - Figure 16.3. The collisions involving pedestrian and cyclist casualties are recorded in Volume 4 - Appendix 16.1: Table 16.1 – 20, Table 16.1 – 22, Table 16.1 – 24, and Table 16.1 – 26.
- 16.5.22 A collision cluster has been determined by the following criteria:
- A location where there are six or more injury collisions occurring within a junction or a 100 m stretch.
 - A location with three or more fatal and / or serious collisions happening either within a junction or within a 100 m stretch.
- 16.5.23 In addition to these criteria, the collision data has been analysed along the full length of the links to identify patterns in accident locations in order to establish any areas of safety concerns.

16.5.24 From the collision data analysis, collision clusters have been identified on the following Primary Access Routes:

- PAR 10: A614
- PAR 14: Boothferry Road
- PAR 15: A63
- PAR 16: Main Street
- PAR 18: A161 (Goole)
- PAR 25: A161 (Eastoft / Crowle)
- PAR 31: A1077
- PAR 32: A1077
- PAR 33: Winterton Road
- PAR 34: Roxy Road / Top Road
- PAR 39: A1077 Sluice Road
- PAR 40: A1077
- PAR 43: A18
- PAR 47: A15
- PAR 49: B1206
- PAR 52: College Road
- PAR 77: A1033 (through Thorngumbald)
- PAR 78: A1033 Hull Road / Patrington Road / Station Road

16.5.25 Additionally, the following collision clusters have been identified at SRN / MRN junctions that connect to Primary Access Routes:

- M18 Junction 6
- M180 Junction 5
- M180 Junction 2
- Frodingham Grange Roundabout

16.5.26 An in-depth assessment on road safety will be undertaken within the ES along all roads forming the Construction Access Routes.

Road Sensitivity

16.5.27 Road sensitivity as defined in the IEMA guidance has been assigned to all assessed road links. The assigned road sensitivity for each road link is shown in Volume 4 - Appendix 16.1: Table 16.1 – 27, Table 16.1 – 28, Table 16.1 – 29, and Table 16.1 – 30. This is based on identified receptors, their proximity to the highway link, nature of roads forming the link and existing infrastructure provision, and recorded road collisions.

Marine Traffic

- 16.5.28 The River Humber is a busy shipping area, with most marine vessel presence in the area attributed to cargo vessels, tankers, tug and towing vessels. The highest vessel density is documented at Immingham Dock, Grimsby Dock and Hull; here vessel densities of up to 2,900 average hours per km² are recorded (Ref 16.27)). The upper areas of the River Humber and tidal River Trent have limited data with regards to vessel traffic, however this will be further investigated at ES.
- 16.5.29 Outside of the River Humber, concentrations of vessel traffic in the North Sea corresponds to offshore assets (i.e., offshore wind, cables etc.).
- 16.5.30 In the immediate nearshore at Easington Landfall however, marine vessel traffic is deemed low when compared to other areas of the North Sea. On average, less than 2 hours per km is documented in the nearshore of the Landfall (all vessel types). The most common vessel presence in relation to the Landfall is dredging / underwater operations and fishing vessels, albeit in low densities (Ref 16.27).
- 16.5.31 Fishing vessel movement is pronounced across the North Sea. An overview of fishing vessel activity is provided in Table 14-7 within Chapter 14: Socio-economics, Recreation and Tourism.
- 16.5.32 For a full outline of marine vessel activity in the offshore / marine area please refer to the offshore NEP project.

Future Baseline

- 16.5.33 Based on the proposed construction programme for the Project, the peak year for construction activities that would affect each road link comprising the Construction Access Routes has been estimated. The future baseline traffic along these road links has been calculated by firstly applying an appropriate growth factor derived from TEMPro (Ref 16.23) to the baseline traffic flows.
- 16.5.34 Additionally, based on the location of the access points, numerous Construction Access Routes serve several access points. Therefore, to establish the peak construction traffic movements per road Link, a total of all construction traffic which is anticipated to use the Link to access the Project has been calculated. Thus, the peak activity on each road link differs based on the programme hence the different future baseline years forming the Transport Assessment.

- 16.5.35 Future Baseline traffic flows on road links forming the Construction Access Routes are shown in Volume 4 - Appendix 16.1: Table 16.1 – 31, Table 16.1 – 32, and Table 16.1 – 33.
- 16.5.36 A review of all committed developments will be undertaken for the assessment within the ES to identify other developments or highways schemes that could generate additional future baseline traffic along the construction routes.
- 16.5.37 The future baseline for Pedestrians, Cyclists and Horse-Riders will also be assessed in the ES and will reflect any anticipated changes affecting these users.

16.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 16.6.1 Environmental considerations have influenced the Project throughout the design development process, from early options assessment through to refinement of the Project design. An iterative process has facilitated design updates and improvements, informed by environmental assessment and input from the Project design teams, stakeholders and non-statutory public consultation.

Site Access

- 16.6.2 During the pipeline construction phase, temporary construction accesses will be required from the public highway network. There will also be a requirement for permanent access during the operation and maintenance phase to allow for routine maintenance and inspection of the Project. Temporary construction and permanent operational access locations are proposed across the pipeline construction corridor.
- 16.6.3 Permanent operational accesses will be required at all Above Ground Installations (AGI) including Block Valve Station (BVS) locations and the Pump Facility and will be designed in accordance with the DMRB. During construction these will be designed to the same standards as temporary construction accesses as a minimum. However, post construction some or all elements of the access design will be retained to ensure access can be maintained during the operational phase for maintenance.

- 16.6.4 There are approximately 170 access points to facilitate temporary construction from the public highway network, of which 13 access points are to be maintained permanently for operational access. Proposed access point locations are shown in Volume 3 - Figure 16.1.

Lockout Points

- 16.6.5 To ensure adequate access to the pipeline construction corridor, screening has been carried out to identify confirmed and potential lockout points, assuming a worst-case scenario to ensure sufficient access is available to the construction haul road. Proposed access point locations are shown in Volume 3 - Figure 16.1.

Construction Access Routes

- 16.6.6 The Construction Access Routes were developed considering traffic related issues and constraints on the network including:
- Shortest available routes between the draft Order Limits and the SRN.
 - Weight restrictions.
 - Road classification.
 - Road layout.
 - Traffic calming measures.
 - Sensitive receptors (such as schools, areas of high pedestrian movements).
 - Settlements.
 - Visibility constraints.
 - Restricted access.
 - Speed limits and traffic speeds.
 - Junctions at or near capacity during peak periods.
 - Gradients.
 - PRow and cycle route networks.
- 16.6.7 The Construction Access Routes were recently discussed with NH and all affected LHAs as summarised in Table 16-5. Feedback will be addressed within the ES and feasibility of alternative access routes to those currently proposed will be considered by the design team.

Construction Traffic Movements

- 16.6.8 The total number of vehicle movements generated as a result of construction activities throughout the Project construction period have been calculated and

assigned to the relevant site accesses. These movements are associated with the pipeline construction using a traditional Tunnel Boring Machine method.

- 16.6.9 The total number of vehicle movements on the assessed road links forming the Construction Access Routes has been calculated. This involved adding up cumulative construction traffic flows for access points that will be accessed using the same roads and where an overlap in construction activities is anticipated. To assess the worst-case per road Link, the possibility of SARs being used as an alternative to the PARs has been taken into consideration.
- 16.6.10 To the south of the River Humber at the Project site, there are multiple options being considered. For the Tunnel Boring Machine (TBM) Construction this includes:
- Option 1: A one-way system loop using a combination of two lane and single lane roads with passing places through Goxhill and South End.
 - Option 2: A two-way Chapel Field Road and haul route / bypass onto Soff Lane. Chapel Field Road to be improved for two-way flows.
 - Option 3: Two-way system Via Immingham Port.
 - Option 4: Construction of a haul road via lockout points resulting in two-way flows via East Halton.
- 16.6.11 The anticipated construction traffic flows for all Construction Access Routes flows are summarised in Volume 4 - Appendix 16.1: Table 16.1 – 33, Table 16.1 – 34, Table 16.1 – 35, and Table 16.1 – 36.
- 16.6.12 In advance of the DCO submission, NEP intends to undertake some early investigation works to test ground conditions, with the key aim of understanding the feasibility of using a Horizontal Directional Drill (HDD) method for the pipeline to cross under the River Humber, as an alternative to the traditional tunnel method. HDD is the preferred method as it is anticipated to have significantly reduced environmental effects and offers programme benefits in comparison to the tunnelling method. The HDD method would take less time to complete the crossing of the River Humber. This is beneficial for the community in terms of minimising disruption on local roads and in relation to marine traffic.
- 16.6.13 If the HDD method is used the Construction Access Route is as follows:
- One way route for HGV - in via Ferry Road, out via Skitter Road and Townside with passing places provided on both. Two-way for cars / LGVs along this route (assumed worst-case).

Embedded Mitigation

- 16.6.14 Environmental appraisal has been an integral part of the Project design from the outset, which has meant that the Project has been able to avoid environmentally sensitive features as far as reasonably practicable.
- 16.6.15 Embedded measures are those that are intrinsic to and built into the design of the Project. The design of the Project is on-going and embedded mitigation measures will continue to be developed until submission of the DCO application. However, embedded measure proposed to be applied during the construction phase of the Project is included below in Table 16-10.

Table 16-10 – Embedded Mitigation

Ref	Measure	Project phase	Responsible party
TT1	Pipeline to be adequately buried below the predicted cliff line and seabed profile throughout its design life (25 years).	Design	Design Team
TT2	Where practical the delivery of materials along the construction haul road will be prioritised in order to minimise traffic impact on identified sensitive receptors.	Construction	Main Works Contractor
TT3	CEMP to be developed and adhered to.	Construction	Contractor
TT4	The cofferdam, if used, and other associated infrastructure will be present for as short a time as. reasonably practicable during construction	Construction	Contractor
TT5	Relevant notifications to inform other sea users of installation works (i.e., Notice to Mariners, Kingfisher Bulletin)	Construction	Contractor
TT6	Vessel Management Plan (VMP) to be developed as relevant	Construction	Contractor

Ref	Measure	Project phase	Responsible party
TT7	Compliance with Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS)	Construction	Contractor
TT8	DEMP to be developed and adhered to	Decommissioning	Contractor

Standard Mitigation

- 16.6.16 Standard mitigation measures, comprising management activities and techniques, would be implemented during construction of the Project to limit effects through adherence to good site practices and achieving legal compliance.
- 16.6.17 Control measures specific to Traffic and Transport will be included within the Outline CTMP. Identified provisional control measures (subject to change following statutory consultation) proposed to be applied during the construction phase of the Project at this stage include:
- The Main Work Contractor(s) and sub-contractor vehicles arriving at site would comply with appropriate safety and environmental standards.
 - All construction HGV would adhere to the designated construction routes to and from the Project.
 - Emergency access protocols would be put in place and would be identified within the site Health and Safety Plan.
 - The Main Works Contractor(s) would ensure that debris deposits onto the public road because of construction traffic are minimised as much as possible and are cleared away if they occur.
 - Appropriate road signs warning motorists of the site access / egress and of construction HGV turning in and out of the site would be provided and installed.
 - Provision of appropriate road markings and signs would be in place to warn the public of increased traffic movements to and from the site during construction.
 - Site inductions would cover traffic safety, highlighting the need to pay special attention to vulnerable road users.
 - Measures for highway reinstatement.

- A commitment for the Main Works Contractor(s) to prepare a Driver Information Pack prior to construction commencing covering variety of topics and providing information on the requirements of working on the Project.
- A Staff Travel Plan would be prepared by the Main Works Contractor(s) prior to construction commencing with the aim of proactively managing trips to and from the site, to minimise local effects by reducing the number of single occupancy vehicle trips and encouraging the uptake of sustainable modes of travel.

16.6.18 The draft Outline CTMP will provide details of the proposed traffic management of delivery vehicles and other traffic generated during the construction phase at this stage of the Project. It identifies measures designed to avoid and reduce the effect wherever possible between construction site traffic and other road users. The CTMP(s) would be implemented by the Main Works Contractor(s) to ensure that all traffic movements associated with the Project's construction works operate in a compliant manner.

16.7 Preliminary Assessment of Potential Impacts

Construction

- 16.7.1 The primary Traffic and Transportation impacts associated with the Project would be as a direct result of an increase in traffic flows on the surrounding roads used by construction vehicles. A preliminary appraisal has been undertaken to identify the likely percentage increase in HGV and in total traffic on the local road network. The predicted increase has been appraised against 12-hour flows (07:00-19:00 hrs) and appraised to determine if these roads need further environmental appraisal.
- 16.7.2 Volume 4 - Appendix 16.1: Table 16.1 – 37, Table 16.1 – 38, Table 16.1 – 39, Table 16.1 – 40 and Table 16.1 – 41 sets out the predicted increase in traffic on local road network roads.
- 16.7.3 Following discussions with North Lincolnshire, North Yorkshire, and East Riding of Yorkshire Highway Authority, it has been proposed that construction traffic will avoid travelling to / from Site during school times. The restriction of HGV traffic at certain times along the route are due to the schools identified within the area which have been taken into consideration. The schools which have been discussed with the LHA include Goxhill Primary School, East Halton Primary School. South Ferriby Primary School, along the PARs identified in Volume 4 -

Appendix 16.1: Table 16.1 – 41. Additional PARs may be added to this table in the ES as discussions and engagement continue.

- 16.7.4 Based on a school day of 09:00-15:30, construction traffic will avoid travelling to or from during drop-off and pick-up times. Based on this, an analysis for the Construction Access Routes which pass schools have been assessed against a 10-hour period. Volume 4 - Appendix 16.1: Table 16.1 – 41 sets out the predicted increase in traffic on local road network roads.
- 16.7.5 If the increases meet or exceed the IEMA rules as described in Section 16.4, the need for further assessment has been identified and will be assessed, with the results presented within the ES chapter.
- 16.7.6 As can be seen from Table 16.1 – 37 to Table 16.1 – 41 , the predicted increase for 12-hour HGV flows (07:00-19:00 hrs) exceeds the 10% (for sensitive roads) and 30% threshold (for non-sensitive roads) on several of the assessed local road links. As such, further environmental appraisal of potential Traffic and Transport effects would be required as part of the EIA in line with the assessment criteria outlined within Section 16.4.
- 16.7.7 Additionally, while the projected increase in HGV traffic is large, it has to be seen in the context of the existing and future traffic baseline traffic flow on each of the Construction Access Routes, which for a number of links, is notably low. This means that even a small number of construction vehicles results in a large percentage change. Where this occurs, it is considered unlikely that significant effects would be realised given the low number of construction vehicles expected. Using professional judgement, the Traffic and Transport assessment within the ES will adjust the significance of effects where appropriate for these road links and this would be undertaken on a site-by-site basis, examining road link characteristics and sensitivity of receptors.
- 16.7.8 The potential impacts for Traffic and Transport associated with the construction phase are provided in Table 16-11.

Table 16-11 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Pedestrians	High	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances where temporary closures or diversion of footways or PRoW are proposed. Fear and intimidation due to increase in traffic and HGV Loss of amenity	Volume 4 - Appendix 16.1: Table 16.1 – 37 to Table 16.1 – 41, identifies which road links on the Construction Access Routes require detailed environmental assessment within the ES. This is based on whether the Link is anticipated to exceed the traffic increase threshold of 30% / 10% depending on their sensitivity.	Temporary	Adverse	Direct
Cyclists	High	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances - Fear and intimidation Loss of amenity	Volume 4 - Appendix 16.1: Table 16.1 – 37 to Table 16.1 – 41, identifies which road links on the Construction Access Routes require detailed environmental assessment within the ES. This is based on whether the Link is anticipated to exceed the traffic increase	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
			threshold of 30% / 10% depending on their sensitivity.			
Horse - Riders	High	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances where temporary closures or diversion of footways or PRow are proposed. Fear and intimidation due to increase in traffic and HGV Loss of amenity	Volume 4 - Appendix 16.1: Table 16.1 – 37 to Table 16.1 – 41, identifies which road links on the Construction Access Routes require detailed environmental assessment within the ES. This is based on whether the Link is anticipated to exceed the traffic increase threshold of 30% / 10% depending on their sensitivity.	Temporary	Adverse	Direct
Bus Passengers	Low	User delay through increased journey times Reduction in road safety	Volume 4 - Appendix 16.1: Table 16.1 – 37 to Table 16.1 – 41, identifies which road links on the Construction Access Routes require detailed environmental assessment within the ES. This is based on whether the Link is anticipated	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
			to exceed the traffic increase threshold of 30% / 10% depending on their sensitivity.			
Car drivers / passengers	Low	Delay through increased journey times Reduction in road safety	Volume 4 - Appendix 16.1: Table 16.1 – 37 to Table 16.1 – 41, identifies which road links on the Construction Access Routes require detailed environmental assessment within the ES. This is based on whether the Link is anticipated to exceed the traffic increase threshold of 30% / 10% depending on their sensitivity.	Temporary	Adverse	Direct
Marine traffic	Medium	There is potential for the physical presence of vessels associated with Project construction to obstruct other sea users, i.e., marine traffic. However, the industry as a whole is tolerable to a degree of displacement. Whilst it is	Minor	Short-term	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		appreciated installation activities may cause a degree of disturbance to marine traffic in the River Humber (due to prominent port locations), vessels (i.e., tanker) operating in the area will be experienced in navigating around installation vessels; with passenger vehicles aware and prepared to navigate clear of any additional vessels associated with installation. Any displacement will therefore be highly localised and occur over short durations. Impacts at Easington Landfall are considered to be limited considering low vessel densities which overlap with the draft Order Limits.				

Operation

- 16.7.9 During the operation phase, the Project will be maintained by a limited number of operatives across the route, with additional infrequent trips associated with maintenance / inspections or repairs when required. Staff vehicles and those used for maintenance are primarily expected to be pickup trucks and vans, with HGV rarely accessing the site. As such, an assessment of the impacts during the operational phase have been scoped out as they are unlikely to cause significant effects. Any operational traffic would be limited to routine maintenance and inspection activities, which would be an increase less than the 30% (or 10% in sensitive areas) baseline criteria.
- 16.7.10 In addition, operational impacts to marine traffic are considered to be negligible due to limited exclusion impacts foreseen. Project vessels during the operation phase would only be from maintenance activities which are not anticipated to result in significant additional vessel presence within the draft Order Limits of the Project.

Decommissioning

- 16.7.11 The transport appraisal of decommissioning phase effects will be undertaken for traffic movements associated with dismantling of the AGIs and the Pump Facility. The pipelines are expected to be left in-situ. The AGIs and Pump Facility will be dismantled, with all equipment removed, and the land returned to its former use.
- 16.7.12 No decommissioning works will be carried out until the relevant planning authority has approved the Project. The decommissioning traffic flows for the removal of the AGIs and Pump Facility are anticipated to be significantly less than those for the construction phase. Therefore, the vehicles flow associated with decommissioning are not expected to exceed the construction vehicle flows. Consequently, the worst-case scenario in terms of traffic impact will be considered within the construction phase assessment. For these reasons, decommissioning is not predicted to result in a significant increase in traffic flows, and therefore, no further assessment will be required. As such, the decommissioning phase has been scoped out.
- 16.7.13 In relation to marine traffic, given the pipeline will remain in-situ, no decommissioning impacts are foreseen and will be buried to a sufficient depth to prevent exposure.

16.8 Additional Mitigation and Enhancement Measures

- 16.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 16.7.
- 16.8.2 No additional avoidance, mitigation and compensation measures, in addition to the measures identified in Section 16.6, are proposed at this stage.
- 16.8.3 The effectiveness of the proposed embedded control and mitigation measures will be assessed within the ES. If necessary, additional mitigation and enhancement measures would be identified and assessed to ensure that adverse effects on receptors and other road users are minimised.

16.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 16.9.1 Table 16-13 below summarises the preliminary assessment of potential significant effects associated with the Project.

Table 16-12 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Pedestrians	High	Construction	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances where temporary closures or diversion of footways or PRow are proposed. Fear and intimidation due to increase in traffic and HGV - Loss of amenity	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Cyclists	High	Construction	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances - Fear and intimidation - Loss of amenity	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Horse-Riders	High	Construction	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances where temporary closures or diversion of footways or PRow are proposed. Fear and intimidation due to increase in traffic and HGV - Loss of amenity	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Bus Passengers	Low	Construction	- User delay through increased journey times - Reduction in road safety	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Car drivers / passengers	Low	Construction	- Delay through increased journey times - Reduction in road safety	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
						Routes which exceed the traffic increase threshold.
Marine traffic	Medium	Construction	There is potential for the physical presence of vessels associated with Project construction to obstruct other sea users, i.e., marine traffic. However, the industry as a whole is tolerable to a degree of displacement. Whilst it is appreciated installation activities may cause a degree of disturbance to marine traffic in the River Humber (due to prominent port locations), vessels (i.e., tanker) operating in the area will be experienced in navigating around installation vessels; with passenger vehicles aware and prepared to navigate clear of any additional vessels associated with installation. Any displacement will therefore be highly localised and occur over short durations. Impacts at Easington Landfall are considered to be limited considering low vessel densities which overlap with the draft Order Limits.	Short-term	NA	Slight

16.10 Next Steps

Design Development

- 16.10.1 Environmental considerations have influenced the Project throughout the design development process, from early options assessment through to refinement of the Project design. An ongoing iterative process will continue to facilitate design updates and improvements, which will be informed by environmental assessment and input from the Project design teams, stakeholders and statutory public consultation.
- 16.10.2 A Construction Staff Travel Plan would be prepared by the Main Works Contractor with the aim of proactively managing trips to and from the site, to minimise local impacts by reducing the number of single occupancy vehicle trips and encouraging the uptake of sustainable modes of travel. As the design progresses, consideration will be given to moving materials, spoil and AILs by waterways and rail. If considered a viable option, the impact of this will be assessed and reported in the ES. Reference will be made to NH water preferred policy (Ref 16.18).

Engagement

- 16.10.3 Additional stakeholder engagement with LHAs, NH and other relevant parties will be undertaken as required. This engagement will be used to ensure that the impact from Traffic and Transport on sensitive receptors and other road users is minimised, and that appropriate mitigation measures are identified. Continued engagement will further be undertaken with the Maritime Coastguard Agency as required, alongside other Port Authorities in relation to the marine traffic assessment at ES.
- 16.10.4 Further engagement will be undertaken with PRow officers to identify and discuss affected PRow and mitigation measures, including diversionary routes.

Surveys

- 16.10.5 Once construction routes are finalised and agreed with relevant LHAs, the need for additional traffic surveys will be identified. Where required, traffic surveys will be commissioned, and traffic flow data will be collected using ATCs and MCC surveys. The latter may be required if it is agreed that a Transport Assessment would be needed following further discussions with NH and the LHA on construction traffic total and HGV traffic expected at peak times.

16.10.6 Following engagement with NH and LHAs, the EIA assessment could also consider additional data and data sources, including surveys along PRoW affected by the Project to gather information of the existing usage.

16.10.7 No marine traffic surveys are proposed to be undertaken.

Further Assessment

16.10.8 The assessment of construction traffic impacts will be undertaken to establish road links where the flows generated by the Project increase baseline traffic and HGV flows by 30% or 10% in specifically sensitive areas. On links where these thresholds are exceeded appraisal of Traffic and Transport effects on other road users will be carried out.

16.10.9 The anticipated total number of construction workers involved in key construction phase activities has been identified in Chapter 2, Table 2-14. It is currently not known if these activities would run concurrently. It has been assumed that would arrive before and after the shift starts.

16.10.10 Potential cumulative effects on the local highway network from this Project and all other committed developments, including transport schemes, will be assessed, and taken into account of when generating the predicted future baseline vehicle flows. Relevant committed developments would be confirmed with local authorities and NH.

16.10.11 No further assessments with respect to marine traffic are proposed.

16.11 References

- Ref 16.1 - Highways Act 1980. Available at:
<https://www.legislation.gov.uk/ukpga/1980/66/contents>
- Ref 16.2 - New Roads and Street Works Act 1991. [online] Legislation.gov.uk. Available at:
<https://www.legislation.gov.uk/ukpga/1991/22/contents>
- Ref 16.3 - Transport Act 2000. Available at:
<https://www.legislation.gov.uk/ukpga/2000/38/contents>
- Ref 16.4 - Planning Act 2008. Legislation.gov.uk. Available at:
<https://www.legislation.gov.uk/ukpga/2008/29/contents>
- Ref 16.5 - Department for Energy Security and Net Zero (DESNZ). (2023). Available at:
<https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf> (EN-1)

- Ref 16.6 - Department for Energy and Climate Change (DECC) (2024). National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-natural-gas-supply-infrastructure-and-gas-and-oil-pipelines-en-4/national-policy-statement-for-natural-gas-supply-infrastructure-and-gas-and-oil-pipelines-en-4>
- Ref 16.7 - Ministry of Housing, Communities and Local Government (2024). National Planning Policy Framework. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2>
- Ref 16.8 - East Riding of Yorkshire Council. (2021.). Local transport plan. Available at: <https://www.eastriding.gov.uk/council/plans-and-policies/other-plans-and-policies-information/transport/local-transport-plan/>
- Ref 16.9 - North Lincolnshire Council. (2024). Planning policy - Local Development Framework - North Lincolnshire Council. Available at: <https://www.northlincs.gov.uk/planning-and-environment/planning-policy-local-development-framework/>
- Ref 16.10 - North Lincolnshire Council. (2025). Road safety - North Lincolnshire Council. Available at: <https://www.northlincs.gov.uk/roads-paths-and-transport/road-safety/>
- Ref 16.11 - North Lincolnshire Council. (2024). Local Transport Plan 2011-2026 - North Lincolnshire Council. Available at: <https://www.northlincs.gov.uk/roads-paths-and-transport/local-transport-plan-2011-2026/>
- Ref 16.12 - East Riding of Yorkshire Council (2025). East Riding Local Plan Update. [online] Available at: <https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/east-riding-local-plan-update/>
- Ref 16.13 - East Riding of Yorkshire Council. (2022). Supporting the renewable and low carbon energy sector - Local Plan Strategy. Available at: https://www.eastriding.gov.uk/planning-permission-and-building-control/planning-policy-and-the-local-plan/east-riding-local-plan-update/local-plan-strategy/local-plan-strategy-item/?entry=supporting_the_renewable_and_low_carbon_energy_sector_6_a_prosperous_economy
- Ref 16.14 - North Yorkshire County Council (2016). Available at: https://harrogatecycleaction.org.uk/wp-content/uploads/2020/01/Local_transport_plan_four_LTP4.pdf
- Ref 16.15 - North Yorkshire County Council. (2022). Abnormal loads and weight limits. [online] North Yorkshire Council. Available at:

<https://www.northyorks.gov.uk/roads-parking-and-travel/roads-and-pavements/abnormal-loads-and-weight-limits>

- Ref 16.16 - Department for Levelling Up, Housing and Communities. (2015). Transport evidence bases in plan making and decision taking. Available at: <https://www.gov.uk/guidance/transport-evidence-bases-in-plan-making-and-decision-taking>
- Ref 16.17 – Depart for Transport (DfT) (2014). Travel Plans, Transport Assessments and Statements. Available at: <https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements>
- Ref 16.18 - National Highways (2019). Water Preferred Policy: Guidelines for the Movement of Abnormal Indivisible Loads. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/799833/WPP_guidelines_2019_DfT_consultation_revision.pdf
- Ref 16.19 - National Highways (2020). Design Manual for Roads and Bridges (DMRB) - National Highways. [online] nationalhighways.co.uk. Available at: <https://nationalhighways.co.uk/suppliers/design-standards-and-specifications/design-manual-for-roads-and-bridges-dmr/>
- Ref 16.20 - Environmental Assessment of Traffic and Movement, Institute of Environmental Management and Assessment, (2023)
- Ref 16.21 – Depart for Transport (DfT) (2022) Available at: <https://www.gov.uk/government/publications/strategic-road-network-and-the-delivery-of-sustainable-development/strategic-road-network-and-the-delivery-of-sustainable-development>
- Ref 16.22 – Department for Transport (DfT), UK (2025) Road traffic statistics. Available at: <https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints>
- Ref 16.23 – Department for Transport, Trip End Model Presentation Program (TEMPro) (2023). Available at: <https://www.gov.uk/government/publications/tempo-downloads>
- Ref 16.24 – Department for Transport (2024) TRA0307: Traffic distribution on all roads by time of day and day of the week in Great Britain. Available at: <https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra>
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17 Waste and Minerals

17.1 Introduction

- 17.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Materials and Waste. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the project provided in Chapter 2: Project Description.
- 17.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Materials and Waste effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project
- 17.1.3 It is noted that at the time of writing, the Project design is progressing, and the required data is not yet available for an assessment of materials to be used and waste to be generated during construction.

17.2 Legislation, Policy and Guidance

Legislation

- 17.2.1 A summary of the international, national, and local legislation relevant to the Waste and Materials assessment for the Project is set out below.

EU Directives

Revised EU Waste Framework Directive 2008/98/EC (Ref 17.1)

- 17.2.2 Directive 2008/98/EC establishes a legal framework for treating waste in the European Union and is designed to protect the environment and human health by emphasising the need for proper waste management, recovery and recycling practices to reduce pressure on finite resources and improve their use. The Directive is transposed by the Waste (England and Wales) Regulations 2011 (see below).

UK Acts of Parliament

Environmental Protection Act 1990 (Ref 17.2)

- 17.2.3 The Environmental Protection Act 1990 deals with issues relating to waste on land, defining all aspects of waste management. The Act provides the definition of waste, establishes the statutory duty of care, lays out waste offences, sets out the duties of the relevant authorities and establishes the Waste Management Licensing.

Environment Act 2021 (Ref 17.3)

- 17.2.4 The Environment Act 2021 makes provision to improve and protect the natural environment, as well as make provision for waste and resource efficiency. This is achieved through the setting of targets, plans, and policies, as well as through the production of statements and reports on environmental protection.

England and Wales Regulations

The Waste (England and Wales) Regulations 2011 (Ref 17.5)

- 17.2.5 The Regulations transposed the Waste Framework Directive 2008/98/EC in England and Wales and require the Secretary of State (and Welsh Ministers) to establish waste prevention programmes and waste management plans that apply the waste hierarchy.

Environmental Permitting (England and Wales) Regulations 2016 (Ref 17.6)

- 17.2.6 The regulations establish a system of environmental permitting for a wide range of potentially polluting activities, e.g. waste operations for recovering or disposing of waste, and also implement a number of European Directives including the Landfill Directive (Ref 17.4). The Landfill Directive (1999/31/EC) regulates waste management of landfill sites. Its aim is to reduce reliance on landfill as a disposal option and seeks to decrease the environmental impacts of landfills and reduce the risk to human health while imposing a consistent minimum standard for landfills

Policy

National Planning Policy

- 17.2.7 National Planning Policy relevant to Materials and Waste is detailed in Table 17-1.

Table 17-1 – Summary of National Planning Policy relevant to Materials and Waste

Planning Policy Reference	Policy Context	How it is considered within this PEIR
National Policy Statement for Energy EN-1 (Ref 17.7)		
5.15 – Resource and Waste Management	EN-1 notes that an applicant seeking consent for an energy infrastructure proposal should, as part of its assessment, consider the sustainable arrangements for managing any waste produced and assess the impact of the waste arising from the development proposal on the capacity of waste management facilities. Policy 5.15 – Resource and Waste Management, paragraph 5.15.2 states “Sustainable waste management is implemented through the waste hierarchy, which sets out the priorities that must be applied when managing waste. These are (in order): • Prevention • Preparing for reuse • Recycling • Other recovery, including energy recovery • Disposal”	This will be considered during the materials and waste assessment contained within the ES, with reference made to any waste generated being managed via the Waste Hierarchy. The design information that the assessment is based on will be available once the preliminary design has been fixed.
NPPF (Ref 17.8)		

Planning Policy Reference	Policy Context	How it is considered within this PEIR
2 – Achieving sustainable development	2 - Achieving sustainable development “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)”: Paragraph 8 c) “An environmental objective includes minimising waste and pollution to protect and enhance our natural, built and historic environment.”	Achieving sustainable development will be considered during the materials and waste assessment contained within the ES. The assessment has been started and will progress once the preliminary design has been fixed post Statutory Consultation. Reference will be made to any waste generated being managed via the Waste Hierarchy.
17 – Facilitating the sustainable use of minerals	Paragraph 223 c) “safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas and adopt appropriate policies 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)”	A Minerals Impact Assessment has commenced however is not sufficiently progressed to report on at the time of PEIR publication. The outcome of the Mineral Impact Assessment will be included in the ES.

Local Planning Policy

- 17.2.8 Local Planning Policies relevant to Materials and Waste is detailed in Table 17-2.

Table 17-2 – Summary of Local Planning Policy relevant to Materials and Waste

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
North Yorkshire County Council Minerals and Waste Joint Plan 2015 – 2030 (adopted February 2022) (Ref 17.9)	S01	“Safeguarded surface mineral resources ensuring identified minerals are protected from other forms of non-mineral development.”	A Minerals Impact Assessment has commenced however is not sufficiently progressed to report on at the time of PEIR publication. The outcome of the Mineral Impact Assessment will be included in the ES.
	S02	“Developments proposed within safeguarded surface mineral resource areas where applications for development other than mineral extraction should include an assessment of the effect of the proposed development on the mineral resource beneath or adjacent to the site of the proposed development.”	
North Lincolnshire Council – Local Development Framework (adopted June 2011) (Ref 17.10)	Policy CS21	“Safeguarding of mineral resources from other development that would prejudice future mineral extraction.”	A Minerals Impact Assessment has commenced however is not sufficiently progressed to report on at the time of PEIR publication. The outcome of the Mineral Impact Assessment will be included in the ES.
North East Lincolnshire Council – New Local Plan 2013 – 2032 (adopted 2018) (Ref 17.11)	Policy 44	“Safeguarding minerals and related infrastructure ensuring identified mineral deposits of sand (including silica sand) and gravel are safeguarded and are not needlessly sterilised.”	A Minerals Impact Assessment has commenced however is not sufficiently progressed to report on at the time of PEIR publication. The outcome of the

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
			Mineral Impact Assessment will be included in the ES.
	Policy 48	“Safeguarding waste facilities and related infrastructure ensuring existing waste management facilities are protected from encroaching incompatible development”	This will be considered in the Waste assessment to be included within the ES, with reference to the impact of the Project on surrounding waste infrastructure.
East Riding of Yorkshire Council – Joint Minerals Local Plan (2019) (Ref 17.12)	AGG 10	“Safeguarding of Mineral Infrastructure and Facilities ensuring existing minerals infrastructure is safeguarded from non-minerals development”	A Minerals Impact Assessment has commenced however is not sufficiently progressed to report on at the time of PEIR publication. The outcome of the Mineral Impact Assessment will be included in the ES.

Guidance

- 17.2.9 The Materials and Waste assessment has been carried out in accordance with the following guidance:
- Institute of Environmental Management and Assessment (IEMA) 2020) Guide to Materials and Waste in Environmental Impact Assessment (Ref 17.13).

17.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 17.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) (Ref 17.15) and the responses to this Scoping Opinion are outlined in Table 17-3.

Table 17-3 – Summary of Scoping Opinion relevant to Materials and Waste

Section Reference	Matter	Comments	Response
ID 3.12.1	Other construction materials used	The Scoping Report considers that “Other materials (excluding excavated arisings and mineral resources) to be utilised for construction are not anticipated to impact on regional or national supplies”. The Inspectorate agrees that significant effects are unlikely and that this matter can be scoped out of the ES.	Noted.
ID 3.12.2	Operational materials used and waste generated	The Scoping Report states that materials used, and waste generated during operation are anticipated to be minimal and limited to the ongoing maintenance and repair of the AGIs and the Pumping Facility. The Inspectorate agrees that significant effects are unlikely and that this matter can be scoped out of the ES	Noted
ID 3.12.3	Decommissioning	The Scoping Report states that waste generated during decommissioning would be limited to the removal of AGI infrastructure and Pump Facility, comprising concrete, metal and asphalt.	Noted.

Section Reference	Matter	Comments	Response
		The Inspectorate agrees that significant effects are unlikely and that this matter can be scoped out of the ES.	
ID 3.12.4	Assessment methodology	Paragraph 16.3.6 states that significance would be derived using the matrix set out in Table 4-1. However, the sensitivity and magnitude criterion used in Tables 16.3 and Table 16.4 respectively do not accord with those presented in Table 4.1. The applicant should ensure consistency in its approach or provide clear explanations where aspect specific approaches depart from the overarching methodology	As noted in paragraph 17.4.1, the assessment methodology follows the IEMA 2020 Guide to Materials and Waste in Environmental Impact Assessment (Ref 17.13) where Tables 16.3 and 16.4 will be used to determine significance. Further explanation will be included within the ES on the methodology for undertaking materials and waste assessment.
Stakeholder comments	Environment Agency	Waste arising from earthworks is acknowledged in Section 16.8.5. We agree that this should be considered and note that reuse of soil within the site might also be classed as a waste operation. There is no mention in Volume 1 of the Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice (DoW:CoP). This provides operators with a framework for determining whether excavated material arising from site during remediation or land development works is waste or has ceased to be waste. We note that it is	The design information that the materials assessment is based on will be available once the preliminary design has been fixed. Where relevant, reference will be made to CL:AIRE DoW:CoP within the ES, should its use be deemed appropriate.

Section Reference	Matter	Comments	Response
		mentioned in Commitment 14 of Volume 3, Appendix F. Please note that an informative about waste and environmental permits is given at the end of this response. Recommendation: refer to, and give consideration to, the CL:AIRE DoW:CoP.	
Stakeholder comments	MMO	The MMO notes that within Chapter 16, Waste and Materials, the applicant should consider the waste framework directive, as well as the London Convention/Protocol and OSPAR convention if considering of disposing waste to sea. This is to ensure any material is suitable for disposal at sea, and also to limit any waste production.	The waste framework directive will be considered within the ES. The design information that the materials assessment is based on will be available once the preliminary design has been fixed. In addition, disposal at sea of acceptable material at sea, will be confirmed within the ES.

Summary of Engagement

- 17.3.2 No specific engagement has been undertaken with the relevant local authorities at the time of writing this PEIR, however engagement and technical consultation will continue throughout the environmental assessment process with the local authorities listed in Table 17-2.

17.4 Assessment Methodology

Baseline Data

Study Area

- 17.4.1 The Study Areas that are applicable to the Project (as defined in the IEMA 2020 Guide to Materials and Waste in Environmental Impact Assessment (Ref 17.13), herein referred to as the 'IEMA Guide') are:
- The Development Study Area - the extent of works within the draft Order Limits, including areas required for construction of the pipeline, above ground installations (AGIs), Pump Facility and temporary access during construction including site compounds, working platforms 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 Project is located. The expansive Study Area encompasses the local authority areas of North Yorkshire County Council, East Riding of Yorkshire Council, North East Lincolnshire and North Lincolnshire Council.

Baseline Data Collection

Desk Study Sources

- 17.4.2 Baseline conditions of the Project were established during a desk study using the following sources:
- The Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security & Net Zero, January 2024).
 - North Yorkshire County Council Minerals and Waste Joint Plan 2015 – 2030 (adopted February 2022).
 - North Lincolnshire Council Local Development Framework (adopted June 2011).
 - East Riding of Yorkshire Joint Minerals Local Plan (adopted 2019).

- North East Lincolnshire Council – New Local Plan 2013 – 2032 (adopted 2018).
- Waste Management 2023 in Yorkshire and the Humber Data Tables (Environment Agency, published September 2024).
- 2023 Waste Data Interrogator – Wastes Removed (Environment Agency, published September 2024) (Ref 17.14).
- 2023 Waste Data Interrogator – Wastes Received (Environment Agency, published September 2024) (Ref 17.14).

Site Visits and Surveys

- 17.4.3 No site visits or surveys were required as part of the PEIR development of the Materials and Waste assessment.

Impact Assessment Methodology

Sensitivity

- 17.4.4 For the purposes of the assessment, IEMA Method W1 (void capacity) will be used when assessing the magnitude of waste. The outputs of comparing sensitivity against magnitude will be assessed against the significance of effects matrix provided within the IEMA Guide. Table 17-4 contains the criteria for assessing sensitivity of materials and waste, taken from the IEMA Guide (Ref 17.13).

Table 17-4 – Materials and Waste Sensitivity Criteria Replicated from the IEMA 2020 Guide (Ref 17.13)

Sensitivity	Materials Criteria 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...
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	...reduce considerably: by 6- 10% as a result of wastes forecast.	...reduce considerably: by 0.5-1% as a result of wastes forecast.

Sensitivity	Materials Criteria 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...
	...comprise little or no sustainable features and benefits compared to industry standard materials.		
Very High	...are known to be insufficient in terms of production, supply and / or stock; and / or ...comprise no sustainable features and benefits compared to industry-standard materials.	... reduce very considerably (by >10%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.	... reduce very considerably (by >1%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.
Notes	* Subject to supporting evidence, sustainable features and benefits could include, for example, materials or products that: comprise reused, secondary or recycled content (including excavated and other arisings); support the drive to a circular economy; or in some other way reduce lifetime environmental impacts.		

Magnitude of Effect

- 17.4.5 Table 17-5 contains the materials and waste magnitude criteria (IEMA 2020) (Ref 17.13).

Table 17-5 – Materials and Waste Magnitude Criteria Replicated from the IEMA 2020 Guide (Ref 17.13)

Magnitude	Materials Criteria Assessment of the Project is made by determining whether the consumption of...	Inert and non-hazardous waste criteria 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	Waste generated by the development will reduce regional* landfill void capacity baseline\$ by 1-5%.	Waste generated by the development will reduce national landfill void capacity baseline\$ by 0.1-0.5%
Moderate	...one or more materials is between 6-10% by volume of the regional* baseline availability; 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%

Magnitude	Materials Criteria Assessment of the Project is made by determining whether the consumption of...	Inert and non-hazardous waste criteria Percentage depletion of remaining landfill void capacity	Hazardous waste criteria The percentage depletion of remaining landfill void capacity
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. # justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed. \$ forecast as the worst-case scenario, during a defined Construction Phase		

Significance

- 17.4.6 Tables 17-6 and 17-7 replicated below from the IEMA Guide outline how the significance of effect will be assessed by considering the sensitivity of a receptor and the magnitude of the impact. Significance of effect is ranked as Neutral, Slight, Moderate or Large or Very Large. For the purpose of this assessment, Moderate, Large or Very Large effects are considered to be 'Significant.' Neutral and Slight effects are considered to be 'Not Significant as detailed in Table 17-7.'

Table 17-6 – Effect Thresholds Criteria Replicated from the IEMA 2020 Guide (Ref 17.13)

	Magnitude of impact					
		No change	Negligible	Minor	Moderate	Major
Sensitivity (or value) 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

Table 17-7 – Significance. Replicated from the IEMA 2020 Guide (Ref 17.13)

Effect	Materials	Waste
Neutral	Not Significant	Not Significant
Slight		
Moderate	Significant	Significant
Large		
Very Large		

Assumptions and Limitations

17.4.7 The following limitations and assumptions have been identified:

- The most recent publicly available data has been used to collate baseline information.
- Some waste facility operators may not release data for reasons of commercial confidentiality. The resulting data gaps may reduce the value of information that is publicly available.
- The environmental assessment of landfill void capacity will be based on information available at the time the full environmental assessment is undertaken.
- The general lag in years of publishing of materials and waste facility capacity has implications for assessments presenting the ‘current picture.’ Relevant assumptions and caveats may be made in the assessment.
- It is assumed that material excavated during construction will be reused on site, wherever practicable.
- There is no published or formalised methodology for assessing the impact upon waste treatment site capacity. Professional judgement has therefore been applied.
- At the time of writing of this PEIR chapter, the Project design is progressing, and the required data is not yet available for assessment of materials to be used and waste to be generated during construction. Further assumptions and limitations encountered during the assessment process will be detailed within the ES.

17.5 Baseline Conditions

Existing Baseline

17.5.1 A baseline desk study has been undertaken utilising available data from publicly available sources to provide information on material resource availability, minerals safeguarding areas, and landfill and waste treatment sites capacity. The most up to date information has been utilised to collate data with the most recent year of data publication provided. Data sources used are listed in Section 17.4.

Materials Currently Required

17.5.2 Land use within the draft Order Limits is predominantly agricultural, with some, commercial and industrial areas. Other assets include highways, rail, canals,

and existing pipeline infrastructure, along with environmental attributes such as rivers and wooded and other heavily vegetated areas.

- 17.5.3 Materials required for current land uses are anticipated to comprise aggregate, concrete, steel, timber and asphalt for use in general maintenance and repair works. Although there is no data available at the time of writing, professional judgement has been used to ascertain that the consumption of materials for current land use is minimal in comparison to regional and national availability.

Mineral Safeguarding Areas

- 17.5.4 Mineral resources are essential to the production of primary aggregates essential to the UK construction and civil engineering sections. Mineral deposits, including sand and gravel, limestone, chalk, and brick clay are safeguarded by Mineral Planning Authorities to ensure a sufficient aggregate supply is maintained.
- 17.5.5 The draft Order Limits of the Project intersect several Mineral Safeguarding Areas, including:
- Sand and gravel and brick clay deposits to the west and south of Goole, as well as sand and gravel deposits safeguarded by East Riding of Yorkshire County Council.
 - Sand and gravel, limestone, chalk, and brick clay deposits intermittently through the draft Order Limits, safeguarded by North Lincolnshire Council.

Waste Currently Generated

- 17.5.6 Current arisings within the draft Order Limits are anticipated to be predominantly from earthworks and vegetation due to agricultural activities, and surplus materials from infrastructure repairs and maintenance. No specific data is available for waste or material arisings currently generated within the draft Order Limits. However, using professional judgment, the current generation within the draft Order Limits is presumed to be minimal, in the context of both waste treatment sites and regional landfill capacity.
- 17.5.7 Table 17-8 details the number of permitted waste recovery sites and waste management routes in Yorkshire and the Humber Region (Environment Agency Waste Management 2023 in England Data, 2024) (Ref 17.16). The availability of waste recovery infrastructure regionally suggests that there is strong potential to divert arisings from site during construction of the Project from landfill. Recovering excavated and waste arisings from the Project and diverting

them from landfill has the potential to materially influence the findings of the assessment of impacts and effects from materials and waste.

Table 17-8 – 2023 permitted waste facilities in Yorkshire and Humber Region (2024)

Waste facility type	Number of permitted sites	Sites accepting waste in 2023
Landfill	67	35
Land disposal	37	16
Incineration	33	15
Transfer	340	235
Treatment	305	252
Metal recovery	333	128
Totals	1,115	681

17.5.8

17.5.9 Table 17-9 details the remaining landfill capacity within the Yorkshire and Humber region (Environment Agency Waste Management 2023 in England Data, 2024) (Ref 17.16).

Table 17-9 – Remaining 2023 landfill capacity in Yorkshire and the Humber, 2023 (September 2024)

Landfill type	Capacity in 2023 (000,m ³)	Capacity in 2022 (000,m ³)	Change in capacity (000,m ³)
Hazardous Merchant	466	476	-10
Hazardous Restricted	-	-	-
Non-Hazardous with SNRHW*	1,243	1,243	0
Non-Hazardous	40,813	40,580	+233
Non-Hazardous Restricted	-	-	-

Landfill type	Capacity in 2023 (000,m ³)	Capacity in 2022 (000,m ³)	Change in capacity (000,m ³)
Inert	24,866	24,928	-62
Total	67,388	67,227	+161

**Stable Non Reactive Hazardous Waste*

Hazardous Waste

- 17.5.10 Baseline data indicates that in the absence of future provision, non-hazardous and total landfill capacity is likely to become an increasingly sensitive receptor throughout the duration of the construction phase and in operation.

Future Baseline

- 17.5.11 In the absence of the Project, it is considered that the current land use within the draft Order Limits would remain predominantly agricultural. However, it should be noted that increased maintenance of nearby ageing infrastructure may be required.
- 17.5.12 Given the scale of the current infrastructure within the draft Order Limits, the consumption of materials, generation of waste and the recovery of site arisings is expected to remain minimal.

17.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 17.6.1 As the design progresses the data that becomes available will be utilised within the Materials and Waste assessment to determine any potential impacts from construction of the Project. If there are impacts that can be avoided through embedded mitigation, these will be detailed within the ES.

Embedded Mitigation

- 17.6.2 Mitigation measures for the construction and operation of the Project will be identified and adopted if required as the design of the Project develops and detailed in the Register of Environmental Actions and Commitments. This may include principles on the following:

- Sustainable resource management (including designing out waste) in the context of the Waste Hierarchy, which promotes prevention, reuse, recycling and recovery of waste before considering disposal.
- The Proximity Principle, where waste is ideally managed as close to the source of generation as is practicable.

Table 17-10 – Proposed Embedded Mitigation

Ref	Measure	Project phase	Responsible party
MW 1	Outline Site Waste Management Plan	Construction	Principal Contractor
MW 2	CL:AIRE DoW: CoP Materials Management Plan (if required)	Construction	Principal Contractor

17.7 Preliminary Assessment of Potential Impacts

Construction Materials

17.7.1 Materials anticipated for use during construction of the Project may include:

AGIs, Pump Facility, Temporary Site Compounds and Haul Roads

- Aggregates (e.g. crushed rock, sand and gravel).
- Asphalt.
- Concrete.
- Metal (e.g. steel fencing).
- Cabling (e.g. power, fibre optic).
- Plastic.
- Landscaping.
- Electrical and mechanical equipment (e.g. lighting, heating, ventilation and air conditioning, telecommunications, instrumentation).
- Excavated material.
- Geosynthetic textiles.

Pipeline

- Metal (e.g. steel).
- Aggregate (e.g. sand and gravel).
- Excavated material.

- Corrosion prevention coating.
- Pre-commissioning fluids (e.g. water, additives).

Horizontal Directional Drilling

- Excavated material.
- Steel (including sleeves from the drilling trials and from sheet piled anchors).
- Drilling fluid (e.g. bentonite).
- Aggregate.

Tunnelling

- Excavated material.
- Concrete.
- Aggregate.
- Drilling fluid (e.g. bentonite).

17.7.2 At the time of writing, estimated quantities of materials required for construction were unavailable. Any potential impacts identified from use of construction materials will be detailed within the ES.

Construction Waste

17.7.3 The preliminary waste streams with the potential to be generated as a result of Project construction include:

- Excavated material comprising:
 - Arisings from trenchless crossings.
 - Arisings from construction of the AGIs and site compounds.
 - Removal of hardstanding and / or aggregate from site compounds and haul roads.
- Construction waste including:
 - Packaging waste.
 - Metal.
 - Timber.
 - Plastic.
 - Concrete.
 - Adhesive / polymers from pipeline welding.
 - Arisings from vegetation clearance.
- General site compound and welfare facility waste including:
 - Food.
 - Recycling.

- PPE.
- Plastic.
- Paper, cardboard.
- Non-hazardous waste from pipeline testing including:
 - Welding debris.
 - Dust.
 - Sludge.
- Liquid effluent including:
 - Non-hazardous drilling or testing fluids.
 - Concrete wash out.
- Welfare facility sewage effluent, grey water from sinks.

17.7.4 At the time of writing, estimated quantities of waste anticipated to be generated during construction are not available. Any potential impacts identified as a result of the Materials and Waste assessment will be detailed within the ES.

Operation

17.7.5 No potential impacts for material use or waste generation are anticipated during the operational phase of the Project, and this topic has therefore been scoped out of future assessment as per the Scoping Opinion.

Decommissioning

17.7.6 No significant impacts for material use or waste generated during the decommissioning phase of the Project are anticipated and this topic has therefore been scoped out of future assessment as per the Scoping Opinion.

17.8 Additional Mitigation and Enhancement Measures

Construction

17.8.1 At the time of writing, no additional mitigation and enhancement measures have been identified for implementation during construction other than those listed in Table 17-10. However, as the Materials and Waste assessment progresses, any additional mitigation and enhancement measures identified, will be contained within the ES.

Operation

17.8.2 No additional mitigation or enhancement measures have been identified during Operation as this topic has been scoped out of future assessment.

Decommissioning

- 17.8.3 No additional mitigation or enhancement measures have been identified during Decommissioning as this topic has been scoped out of future assessment.

17.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 17.9.1 Table 17-11 below summarises potential significant effects associated with the Project.

Table 17-11 – Summary of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Material Resources	Low	Construction	Material resources required by the Project could potentially reduce regional material stocks.	Long term	Preparation of a SWMP. Implementation of procurement practices to order materials when required	Potential significant effects will be detailed within the ES.
Mineral resources (Safeguarded Areas)	Very High	Construction	Safeguarded mineral resources intersected by the draft Order Limits have the potential to be sterilised.	Long term	Preparation of an MMP	Potential significant effects will be detailed within the ES.
Landfill void capacity: inert / non-hazardous	Very high	Construction	Inert waste generated by the Project is considered to be negligible when compared to current landfill void capacity and forecast trends.	Long term	Preparation of a SWMP. Preparation of an MMP	Potential significant effects will be detailed within the ES.
Landfill void capacity	Very high	Construction	Non-inert waste generated by the Project through to completion is considered to be negligible when compared	Long term	Preparation of a SWMP.	Potential significant effects will be detailed within the ES.

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
			to current landfill void capacity.			

- 17.9.2 Potential significant effects identified during the materials and waste assessment will be included in the ES.

17.10 Next Steps

Design Development

- 17.10.1 As the design continues to progress, further design data regarding quantities of materials required for construction will be used to in the Materials and Waste Assessment.

Engagement

- 17.10.2 Engagement with the local authorities listed in Table 17-2 will be undertaken throughout the assessment process with regard to construction materials and waste and minerals impact assessment.

Surveys

- 17.10.3 No surveys are required to complete the Materials and Waste Assessment.

Further Assessment

- 17.10.4 As part of the construction phase materials assessment, a minerals impact assessment will be undertaken as the design progresses. The outcomes of the minerals impact assessment will be included in the ES.

17.11 References

- Ref 17.1 – Revised EU Waste Framework Directive 2008/98/EC
- Ref 17.2 – Environmental Protection Act 1990
- Ref 17.3 – Environment Act 2021
- Ref 17.4 – Landfill of Waste (Landfill Directive) 1999/31/EC
- Ref 17.5 - The Waste (England and Wales) Regulations 2011
- Ref 17.6 – Environmental Permitting (England and Wales) Regulations 2016
- Ref 17.7 – The Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security & Net Zero, November 2023)
- Ref 17.8 – National Planning Policy Framework (Ministry of Housing, Communities & Local Government, December 2024)

- Ref 17.9 – North Yorkshire County Council Minerals and Waste Joint Plan 2015 – 2030 (adopted February 2022)
- Ref 17.10 – North Lincolnshire Council Local Development Framework (adopted June 2011)
- Ref 17.11 – North East Lincolnshire Council – New Local Plan 2013 – 2032 (adopted 2018).
- Ref 17.12 – East Riding of Yorkshire Joint Minerals Local Plan (2019).
- Ref 17.13 – IEMA Guide to Materials and Waste in Environmental Impact Assessment.
- Ref 17.14 – Waste Data Interrogator (Environment Agency, published September 2024).
- Ref 17.15 – Scoping Opinion Proposed Humber Carbon Capture Pipeline (2025).
- Ref 17.16 – Waste Management 2023 in England Data Tables (Environment Agency, published September 2024).

18 Hydrology and Land Drainage

18.1 Introduction

- 18.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of the effects of the Project on Hydrology and Land Drainage. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 18.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Hydrology and Land Drainage effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 18.1.3 This chapter describes the water environment receptors within the Study Area and their associated sensitivities. This chapter also includes the preliminary assessment of coastal water quality at the Easington Landfall.
- 18.1.4 This chapter should be read in conjunction with:
- Chapter 4: EIA Methodology for the broad EIA methodology used.
 - Chapter 5: Agriculture and Soils due to the close association between soils, land management and the land drainage system.
 - Chapter 7: Ecology and Biodiversity due to the close association between water environment features and the biodiversity that they support and the potential for overlapping embedded environmental measures.
 - Chapter 8: Climate due to the influence of climate change on flood risk and the land drainage regime.
 - Chapter 9: Greenhouse Gases due to the influence of climate change on flood risk and the land drainage regime.
 - Chapter 10: Ground Conditions and Hydrogeology, which presents an assessment of potential significant effects on sensitive groundwater receptors, due to the close association between local hydrology, hydrogeology and water environment features (surface waterbodies).
 - Chapter 12: Landscape and Visual due to the close association between some landscape receptors and water environment features (fluvial and coastal waterbodies) and the potential for overlapping embedded environmental measures.

- Chapter 16: Traffic and Transport due to the potential for traffic / plant emissions associated with the Project to negatively affect water environment receptors.
- Chapter 19: Major Accidents and Disasters due to the interactions on dam breaches and flood risk.
- Chapter 20: Coastal Processes which presents an assessment of potential significant effects on sensitive coastal receptors, due to the close association between coastal hydrology and terrestrial water environment features.
- Chapter 21: Cumulative Effects.

18.1.5 This chapter is supported by the following figures:

- Volume 3 - Figure 18.1: Hydrology and Land Drainage Study Area and Receptors.
- Volume 3 - Figure 18.2: Baseline Flood Risk.
- Volume 3 - Figure 18.3: Water Framework Directive Waterbodies and Zone of Influence.

18.1.6 This chapter is supported by the following appendices:

- Volume 4 - Appendix 18.1: Hydrology and Land Drainage Baseline Data.
- Volume 4 - Appendix 18.2: Water Framework Directive Assessment Stages 1 and 2.

18.2 Legislation, Policy and Guidance

Legislation

18.2.1 Legislation relevant to Hydrology and Land Drainage is detailed in Table 18-1.

Table 18-1 – Summary of Legislation relevant to Hydrology and Land Drainage

Legislation	How it is considered within this PEIR
The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (Ref 18.1)	This legalisation aims to ensure that the existing flood and water management regime will continue to operate effectively following the UK's withdrawal from the European Union. This legislation has been considered within the embedded mitigation measures outlined within this chapter.
Part 5 of Environment Act 2021 (Ref 18.2)	Part 5 brings together measures to strengthen and update the existing regulatory and long-term planning framework for water, helping to reduce environmental risks, including to water quality and land drainage. It also strengthens the regulation of water and sewerage undertakers through the Office for Environmental Protection. This legislation has been considered within the embedded mitigation measures outlined within this chapter.
The Water Environment (Water Framework Directive [WFD]) (England and Wales) Regulations 2017 (Ref 18.3)	This legislation implemented the WFD in England and Wales. Under section 2 of the European Union (Withdrawal) Act 2018 (Ref 18.4), the 2017 Regulations continue to have effect in domestic law following the UK's withdrawal from the European Union. The WFD stages 1 and 2 are included in Volume 4 - Appendix 18.2: WFD 1&2.
Land Drainage Act 1991 (Ref 18.5)	This legislation imposes certain controls in relation to the placing of structures and the carrying out of works affecting main rivers and other (ordinary) watercourses. This legislation has been considered within the embedded mitigation measures outlined within this chapter.
Environmental Permitting (England and Wales) Regulations 2016 (Ref 18.6)	
Flood and Water Management Act 2010 (Ref 18.7)	Makes provisions for the management of risks in connection with flooding and coastal erosion. The Project will assess potential changes in coastal flood risk due to Project-related alterations to sediment transport and hydrodynamics. Please also refer to Chapter 20: Coastal Processes in relation to this topic.

Legislation	How it is considered within this PEIR
Environmental Protection Act (Ref 18.8)	Covers the legal responsibilities for controlling pollution of land, air and water through regulating the management of waste. The Project will assess the potential for pollution and ensures compliance with environmental protection measures.
Petroleum Act 1998 (Ref 18.9)	Establishes the North Sea Transition Authority (NSTA) is the licensing / consenting authority for construction and operation of subsea pipelines, including carbon dioxide and hydrogen pipelines.
Marine and Coastal Access Act (MCAA) 2009 (Ref 18.10)	Provides a system for marine management, including a planning system and system for the licensing of activities in the marine environment, as well as providing for the designation of conservation zones.

Policy

National Planning Policy

- 18.2.2 National Planning Policy relevant to Hydrology and Land Drainage is detailed in Table 18-2.

Table 18-2 – Summary of National Planning Policy relevant to Hydrology and Land Drainage

Planning Policy Reference	Policy Context	How it is considered within this PEIR
Overarching National Policy Statement for Energy (EN-1) (Ref 18.11)		
Section 4.10 Climate Change Adaptation and Resilience	4.10.8 “New energy infrastructure will typically 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.”	The impacts of climate change across the Study Area are considered within the future baseline description included in Section 18.5.
	4.10.9 “The ES should set out how the proposal will take account of the projected impacts of climate change, using government guidance and industry standard benchmarks such as the Climate Change Allowances for Flood Risk Assessments, Climate Impacts Tool, and British Standards for climate change adaptation, in accordance with the EIA Regulations.”	The anticipated impacts of climate change on the Project will be taken into consideration in a Flood Risk Assessment (FRA) which will be prepared for the Project and reported in the ES.).
Section 5.8 Flood Risk	5.8.6 “The aims of planning policy on development and flood risk are to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to steer new development to areas with the lowest risk of flooding.”	An FRA will be prepared for the Project. A preliminary assessment of potential impacts relating to flood risk (from all sources) is included in Section 18.7.
	5.8.7 “Where new energy infrastructure is, exceptionally, necessary in flood risk areas (for example where there are no reasonably available sites in areas at lower risk), policy aims to make it safe for its lifetime without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It should also be designed and constructed to remain operational in times of flood.”	Baseline flood risk across the Study Area is addressed in Section 18.5. Flood mitigation measures are included in Section 18.6 and 18.8. Further detail on how the Project will be made safe for its lifetime, without increasing flood risk elsewhere, will be included in the FRA that will be reported in the ES.
	5.8.9 “If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied as defined in https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2 . The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.”	An FRA will be prepared and reported in the ES, which will describe the application of the Sequential Test and if necessary, the Exception Test.
	5.8.12 “Development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage, and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques.”	A preliminary assessment of potential impacts relating to flood risk (from all sources) is included in Section 18.7. The impacts of climate change across the Study Area are considered within the future baseline description included in Section 18.4.27. Flood mitigation measures are included in Section 18.6 and 18.8. The FRA will address these policy aspects in further detail.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	Paragraphs 5.8.13 to 5.8.23 set out the policy with respect to Flood Risk Assessments.	An FRA will be produced for the Project and reported in the ES, in line with these criteria.
	Paragraphs 5.8.24 to 5.8.28 set out the policy with respect to surface water flood risk and mitigation.	Details of the strategy for managing surface water runoff arising from the Project will be assessed in the FRA and surface water drainage designs will include suitable allowances for the effects of climate change.
Section 5.16 Water Quality and Resources	Section 5.16 sets out generic policy on the protection of the water environment during the construction, operation and decommissioning of a project.	A preliminary assessment of potential impacts relating to the water environment is included in Section 18.7. Mitigation measures are included in Section 18.6 and 18.8.
National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref 18.12)		
Section 2.21 Natural Gas and Oil Pipelines: Applicant assessment	Water Quality and Resources, paragraphs 2.21.34 to 2.21.41. These paragraphs refer to sections of EN-1 and describe potential impacts of pipeline projects on water quality and water resources.	The potential impacts described have been considered with reference to the Project and, where relevant, are included in the preliminary assessment in Section 18.7. Potential impacts relating to groundwater are addressed in Chapter 10: Ground Conditions and Hydrogeology.
Section 2.22 Natural Gas and Oil Pipelines: Mitigation	2.22.8 "Mitigation measures to protect the water environment could include techniques for crossing rivers and managing surface water before and after construction, including restoring vegetation and using sustainable drainage systems to control run-off."	Mitigation measures for the water environment are included in Section 18.6 and 18.8.
National Planning Policy Framework (NPPF) (Ref 18.13)		
Section 14 Meeting the challenge of climate change, flooding and coastal change	Section 14 sets out policies specific to managing flood risk and mitigating for and adapting to climate change.	An FRA will be produced for the Project and reported in the ES, in line with the NPPF.

Local Planning Policy

- 18.2.3 Local Planning Policies relevant to Hydrology and Land Drainage are detailed in Table 18-3.

Table 18-3 – Summary of Local Planning Policy relevant to Hydrology and Land Drainage

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby Local Plan Revised Publication 2024 (Ref 18.14)	SG11 – Flood Risk	Proposed development is only permitted in high flood risk areas where: the development is classified as ‘essential’; flood defences can be maintained or provided in settlements for the lifetime of the development; in undeveloped floodplains compensatory flood storage measures can be provided. All proposals in areas subject to flood risk must be accompanied by a flood risk assessment.	A description of baseline flood risk in the Study Area is included in Section 18.5 and a preliminary assessment of potential impacts relating to flood risk is included in Section 18.7. An FRA will be produced for the Project, taking local plan policies into account.
	IC4 - Water Supply, Wastewater Treatment and Drainage Infrastructure	This policy lists the measures that must be incorporated into development with respect to adequate water infrastructure and sewage solutions.	The PEIR is based on information available at this stage in the design process. A preliminary assessment of potential impacts relating to water resources and water interests is included in Section 18.7. A Water Resources Assessment will be undertaken and reported in the ES.
East Riding of Yorkshire Local Plan (Ref 18.15)	ENV6	Environmental hazards, such as flood risk, coastal change, nutrient deposition, aerial pollution, groundwater pollution and other forms	Mitigation measures for the water environment are included in Section 18.6. Coastal change is further

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment.	detailed within Chapter 20: Coastal Processes.
North Lincolnshire Local Development Framework Core Strategy (Ref 18.16)	CS18	The council will actively promote development that utilises natural resources as efficiently and sustainably as possible, including requiring the use of Sustainable Urban Drainage Systems (SuDS) where practicable.	Details of the strategy for managing surface water runoff arising from the Project will be provided in the FRA and surface water drainage designs will include suitable allowances for the effects of climate change.
	CS19	The council will support development proposals that avoid areas of current or future flood risk, and which do not increase the risk of flooding elsewhere.	A description of baseline flood risk in the Study Area is included in Section 18.5 and a preliminary assessment of potential impacts relating to flood risk is included in Section 18.7. An FRA will be produced for the Project to inform the ES, taking local planning policies into account.
North East Lincolnshire Local Plan 2013 to 2032 (Ref 18.17)	33	Development proposals should have regard to the requirements of the flood risk sequential test and, if necessary, the exception test.	Mitigation measures to prevent flood risk resulting from and to the development, including the influence

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		Developments should demonstrate that they will minimise flood risk impacts and mitigate against the likely effects of climate change.	of climate change, are included in Section 18.6 and 18.8. An FRA will be produced for the Project, taking local planning policies into account. It will describe the application of the Sequential Test and, if necessary, the Exception Test.

Guidance

18.2.4 The Hydrology and Land Drainage assessment has been carried out in accordance with the following guidance:

- Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive (Ref 18.18).
- Flood Risk and Coastal Change Planning Practice Guidance (PPG) (Ref 18.19).
- Water supply, wastewater and water quality PPG (Ref 18.20).
- Humber 2100+ (Ref 18.21) and the Humber Flood Risk Management Strategy (Ref 18.22).
- Various Construction Industry Research and Information Association (CIRIA) publications that provide construction, good practice for preventing pollution of the water environment. For example, C532: Control of water pollution from construction sites (Ref 18.23).
- Design Manual for Roads and Bridges (DMRB) LA 113: Road drainage and the water environment (Ref 18.24).
- Pollution prevention for businesses (Ref 18.25).
- Flamborough Head to Gibraltar Point Shoreline Management Plan (Ref 18.26).
- SuDS Guidance from Lincolnshire County Council (Ref 18.27), North Yorkshire County Council (Ref 18.28) and East Riding of Yorkshire Council (Ref 18.29).
- National standards for sustainable drainage systems (SuDS) (Ref 18.30).
- Engineering in the water environment: good practice guide - River crossings, Second edition, Scottish Environment Protection Agency (SEPA) 2010 (Ref 18.31).
- East Inshore and East Offshore Marine Plan (Ref 18.32).
- North East Inshore and North East Offshore Marine Plan (Ref 18.33).
- Local Coastal Management Plans - Local plans developed by authorities and the Environment Agency to manage specific coastal areas based on SMP policies.
- Environment Agency and Marine Management Organisation (MMO) Guidance - Provides specific guidance on licensing, habitat protection and FRA for development in coastal and marine areas.

18.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 18.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and responses to this Scoping Opinion are outlined below in Table 18-4.

Table 18-4 – Summary of Scoping Opinion relevant to Hydrology and Land Drainage

Section Reference	Matter	Comments	Response
3.13.1	Water interests (existing surface water abstractions and discharges) - operational and decommissioning phases	The Scoping Report states that no new consumptive use of surface water resources is proposed during operation and decommissioning, and that safeguards would be put in place to protect surface water quality so there would be no impacts on the integrity of existing water interests. The Inspectorate notes that the proposed development includes a permanently staffed control room at the Pump Facility, with approximately 4 staff. However, given the low number of staff, the Inspectorate considers it unlikely that water consumption would result in significant effects. On the basis that water consumption only relates to use by Pump Facility workers, the Inspectorate agrees that this matter can be scoped out of the ES.	It is confirmed that operational water consumption will be limited to the small Pump Facility workforce. PINS agreement noted.
3.13.2	Watercourses and waterbodies hydromorphology - operational and decommissioning phases	The Scoping Report states that once the working width is reinstated, there would be no impact pathway. In addition, the banks and riparian corridors of watercourses would not be disturbed and there would be a suitable separation distance between channel beds and the crest of the buried pipelines. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.	PINS agreement noted.
3.13.3	Surface water quality - operational and decommissioning phases	The applicant proposes to scope this matter out of further assessment on the basis that no operational discharges of effluents would be generated that would be discharged to surface waters and a suitable post construction land drainage scheme would also be implemented. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.	PINS agreement noted.
3.13.4	Flood risk from surface water and effects on the land drainage regime (quantity and quality of flows) -decommissioning phase	The Scoping Report states that the pipelines would remain in-situ, and the AGIs and Pump Facility would be removed and the land reinstated upon decommissioning. Figure 17.2 of the Scoping Report shows that several of the AGIs are located within Flood Zone 3. At this stage, the Inspectorate does not have sufficient evidence to agree that decommissioning works would not result in significant effects. The impacts of these works should be assessed and mitigation measures put in place, as necessary. Alternatively, if agreement with relevant consultation	The potential effects of decommissioning will be addressed in the FRA and discussed with relevant bodies to demonstrate the evidence that significant effects are not likely. On the assumption this can be demonstrated in the FRA, the assessment of effects will be scoped out of the ES.

Section Reference	Matter	Comments	Response
		bodies that significant effects are not likely can be evidenced within the ES, the Inspectorate is content that an assessment of effects can be scoped out.	
3.13.5	Flood risk from artificial sources - all phases	The Scoping Report states that the project is of low vulnerability to flooding from artificial sources. Subject to the project's Flood Risk Assessment (FRA) confirming this is the case, the Inspectorate agrees that this matter can be scoped out of the ES. In absence of such confirmation, an assessment of likely significant effects should be provided within the ES.	This will be confirmed in the FRA that will support the ES and if confirmed, an assessment of likely significant effects will be provided in the ES. A preliminary assessment of potential impacts relating to flood risk is included in Section 18.7 of this PEIR chapter.
3.13.6	Existing or proposed flood risk management infrastructure –operational and decommissioning phases	The location(s) of flood risk management infrastructure(s) relative to the proposed development have not been identified at this stage. Nevertheless, given the nature of the proposed development, the Inspectorate agrees with the applicant that the operational phase is unlikely to result in significant effects on flood risk management infrastructure. This matter can therefore be scoped out of the ES. With regards to decommissioning, the Inspectorate agrees there would be no impacts from the pipeline being left in situ and that this matter can be scoped out of the ES. In relation to the AGIs and Pump Facility, if the ES can confirm that these project elements are not located in proximity to flood risk management infrastructure, the Inspectorate agrees that an assessment of effects from their decommissioning can be scoped out of the ES. In absence of such confirmation, an assessment of effects should be provided within the ES.	PINS agreement noted. In relation to the AGIs and the Pump Facility, this matter will be addressed in the FRA and the assessment of likely significant effects will be provided in the ES.
3.13.7	Impact magnitude	The applicant's attention is drawn to the comments of the Environment Agency regarding impact magnitude for changes in peak flood levels. The applicant is advised to seek to agree magnitude classifications with the Environment Agency.	The Applicant will engage with the Environment Agency to agree flood impact magnitude classifications, which will be adopted in the ES.
3.13.8	Limitations and assumptions	The applicant should undertake checks to ensure that any existing modelling which is used to inform the FRA and ES represents current and future baseline conditions and uses the most appropriate and up to date fluvial and tidal boundary conditions (where applicable). See the Environment Agency's comment for further details.	Existing Environment Agency models will be reviewed for their suitability, where updates are necessary these will be agreed with the Environment Agency and the data from updated models used to inform the FRA.

Section Reference	Matter	Comments	Response
3.14.7	To be scoped out of the Major Accidents and Disasters (MA&D) chapter and included in Hydrology and Land Drainage: Impacts on watercourses - construction and operational phases	Relevant control measures for when smaller watercourses are to be crossed with open cut techniques will be set out in Chapter 18 – Hydrology and Land Drainage.	Impacts on watercourses during construction and operational phases are scoped into the Hydrology and Land Drainage assessment. A preliminary assessment of potential impacts included in Section 18.7. Mitigation measures are included in Section 18.6 and 18.8. As the Project design is still developing, more detail on mitigation / control measures will be presented in the ES.
3.14.8	To be scoped out of the MA&D chapter and included in Hydrology and Land Drainage: Impacts on intertidal areas – construction and operational phases	The assessment of impacts to the Holderness Coast intertidal area is included in Chapter 18 – Hydrology and Land Drainage.	Impacts on intertidal areas during construction and operational phases are scoped in and have been addressed in this chapter and Chapter 20: Coastal Processes.
3.14.17	To be scoped out of the MA&D chapter and included in Hydrology and Land Drainage: - Dam/ reservoir breaches. - Flood risk. - Coastal erosion and landslides	The assessment of impacts from dam / reservoir breaches, flood risk and coastal erosion and landslides is to be included in Chapter 18 – Hydrology and Land Drainage.	The FRA will consider flood risk from all sources. Effects relating to coastal processes and coastal erosion are further addressed in Chapter 20: Coastal Processes.
3.15.5	Tidal flooding	The Scoping Report notes that no AGIs would be in the intertidal study area. However, the Inspectorate notes the Environment Agency response that there are some AGIs which are at risk of tidal flooding, for example Thorngumbald AGI. On the basis that this matter is assessed within Chapter 17 (as proposed in Table 17-4), the Inspectorate is content that an assessment does not need to be duplicated within this aspect chapter.	This matter has been captured within this Chapter in Section 18.7.
3.15.7	Tidal flooding	The Scoping Report states that there would be limited barriers to existing groundwater flow paths due to the generally shallow excavations to create the pipeline trenches and as the proposed development would be of low vulnerability to flooding from these 'other' sources. The Inspectorate notes that Table 17-4 in the Water Resources, Flood Risk and Land Drainage chapter scopes in flood risk from groundwater for all phases. No information has been provided to explain why this is scoped out at the coastal and intertidal environment. As such, an assessment of likely significant effects, or evidence of agreement with relevant consultation bodies that significant effects are not likely, should be provided within the ES.	The following was stated in Table 19.9, 'There would be limited barriers to existing groundwater flow paths due to generally shallow excavations to create the pipeline trenches and the Project is of low vulnerability to flooding from these 'other sources'. Given the extent of the coastal Study Area, flood risk from groundwater sources for all phases is deemed unlikely due to sediment type and beach profile. Flood risk will further be assessed in more detail within this Chapter, with emphasis on the limited potential for tidal flooding (Section 18.7).

Section Reference	Matter	Comments	Response
Chapter 19 Section 19.2.5 Page 104	Coastal waterbodies	Intertidal sections also extend into other jurisdictions - for completeness, please include North Lincolnshire. Impacts of developments in tidal freshwater at the upper limit of saline intrusion of transitional waterbodies often fall through gaps between freshwater and marine assessments. As the linking habitat between true freshwaters and more marine habitats, it is important that they are given due consideration. In this context, the crossings of the Ouse, Aire and Dutch, are not within transitional waterbodies, but they are tidal. Tidal rivers that are crossed within transitional waterbodies include the Trent, Ancholme and Humber. Recommendation: please include and give consideration, as above.	The scope of Chapter 19 at Scoping was to solely capture the intertidal environment of the Project at the Easington Landfall. At PEIR the intertidal discipline has been fed directly into a number of relevant chapters. This Chapter now captures coastal waterbodies where relevant. The same approach will be followed at ES. This will remove unnecessary duplication of the intertidal scope but will also ensure the intertidal receptors are sufficiently captured. This applies to all Scoping Opinions received on this topic.
Chapter 19 Section 19.7.1 Page 105	Humber waterbody	'Humber estuary' is not a recognised waterbody. The project pipeline will pass under named rivers in the Humber Upper at multiple points and then under Humber Lower.	Naming of waterbodies is to be standardised throughout the Chapter, and further ES.
Chapter 19 Section 19.10.2 Pag 106	Haul road	Re. construction of haul road and reinstatement of cliff, it is possible that groundwater flow would be impeded and cause localised increase in pore pressures, depending on the geology at the landfall site, this may increase the likelihood of sub-aerial mass movement. Recommendation: check and monitor pore water pressures should geological conditions and mass movement factor into cliff stability	The haul road will be assessed as part of the terrestrial scope of this chapter. Implications to coastal processes will be captured within Chapter 20: Coastal Processes due to the route traversing the cliff itself and potential for impacts to the receptor.

Summary of Engagement

- 18.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 18-5 below.

Table 18-5 – Summary of Stakeholder Engagement relevant to Hydrology and Land Drainage

Consultee	Date and Method of Engagement	Summary of Issues Raised	Response
Yorkshire and Humber Drainage Board (representing Reedness and Swinefleet, Dempster, Black Drain and Rawcliffe IDBs) Shire Group representing Ancholme, Goole Field and Selby Area IDBs Isle of Axholme IDB	3/12/2024, meeting	IDB Project briefing to provide an introduction to the Project, key dates, summarise the proposed approach to land drainage, watercourse crossings and EIA scope.	The IDB representatives confirmed that they are happy to meet as a group at key milestones and individually where more focussed location specific discussion is required. Consultation with the IDBs is and will be ongoing as the Project design develops.
Environment Agency	2/12/2024, Email	FRA Scoping Note feedback	The EA confirmed acceptance of the proposed approach to be taken toward the Flood Risk Assessment and noted agreement with that the matters scoped in or out of the FRA. Guidance was also provided with regard to the designs and methods of main river crossings.
Environment Agency	31/1/25, response to scoping opinion	Appendix D (Scoping Assessment of Major Accidents and Disasters) should include reference to unintentional breaching of the chalk aquifer, resulting in uncontrolled artesian groundwater flow which could lead to flooding and water resource losses. This could be recognised in the discussion of Flood Risk but has been excluded.	Flood risk from all sources will be covered in the FRA which will inform the ES. The chalk aquifer and artesian groundwater will be discussed in Chapter 10: Ground Conditions and Hydrogeology.
Environment Agency	05/9/2025, meeting	Flood risk meeting	The EA confirmed acceptance to the proposed approach to be taken forward in carrying out the FRA, including the proposed calculations methods for assessing the impacts of watercourse crossings and Project works within floodplains.
Environment Agency	22/9/2025, meeting	Review of Stages 1 and 2 of the WFD screening assessment	The EA confirmed acceptance of the proposed approach to be taken toward the WFD Assessment and noted agreement with the waterbodies screened in or out of the assessment, with the exception of two surface waterbodies, to be cross-checked with the final DCO boundary at Stage 3 of the assessment. Guidance was also provided with regards to the need to consider the worst-case effect from potential dewatering, and the overall Project water supply strategy.
North Lincolnshire LLFA	27/11/2024	FRA Scoping Note feedback	The LLFA note, after reviewing the methodology for the FRA, the proposed approach to be pragmatic and appropriate in relation to the mitigation of flood risk.
Anglian Water and Yorkshire Water	Ongoing for HDD element of the Project	Water supply strategy	The water supply strategy is still being developed for both the main Project and HDD trial. Further information on the impacts of the supply strategy will be included in the ES.

Consultee	Date and Method of Engagement	Summary of Issues Raised	Response
Environment Agency	20 August 2024	Summary of written response to Public Consultation stage of the Project: Highlighted the need to address the protection and enhancement of biodiversity around watercourse corridors. Highlighted the need to identify designated sites, protected habitats and species affected by the Project, including from any access routes and permanent or temporary compounds, and any mitigation and compensation requirements. Noted the desire to see consideration of the requirements of BNG and for the Project to consider the relevant Local Nature Recovery Strategies, the Water Framework Directive mitigation measures and the River Basin Management Plan when identifying options for BNG.	The Project will consider the WFD mitigation measures as part of WFD Screening.

18.4 Assessment Methodology

Baseline Data

Study Area

- 18.4.1 The Study Area for the preliminary assessment includes all land within the draft Order Limits with an additional 500 m buffer from this boundary. The Study Area is illustrated in Volume 3 - Figure 18.1: Surface Water Features and Study Area. This Study Area is justified based on technical knowledge of similar projects and has been set following consideration of the distance over which likely significant effects on the water environment can reasonably be expected to occur.
- 18.4.2 The assessment considers predominantly terrestrial waterbodies and would also include the inter-tidal zone up to Mean Low Water Springs (MLWS) notably at the landfall, where the Project interacts with the offshore carbon dioxide transportation pipeline and infrastructure. Whilst this Study Area is deemed appropriate, in bespoke locations, the Study Area may be extended where potential impacts may be more widespread. For example, at crossings of sensitive watercourses reaches of up to 1 km may be assessed.
- 18.4.3 The FRA that will be prepared to inform the EIA, will include a larger Study Area to ensure any potentially relevant impacts of the Project are considered within a floodplain cell or at the catchment scale, where this is appropriate.
- 18.4.4 The Study Area for the WFD screening assessment is defined by a Zone of Influence (Zol). Zols are set following consideration of the nature, scale and duration of a projects' construction and operational activities. The Zol has been agreed with the EA during consultation.
- 18.4.5 As described in Volume 4 - Appendix 18.2: Water Framework Directive Assessment Stages 1 and 2, for the terrestrial activities proposed by the Project, the proposed Zol will include all surface and groundwater bodies regulated by the WFD that could be directly impacted (i.e., within the direct footprint of the Project) and those within 500 m of the draft Order Limits with the potential to receive drainage discharges from the Project or which are downstream of directly impacted waterbodies, to account for potential indirect impacts. Protected areas with a surface or groundwater dependency within 500 m of the draft Order Limits will also be included in the scope of the assessment following consideration of the distance over which the Project activities can

reasonably have the potential to cause significant effects / influence the achievement of the WFD status.

- 18.4.6 In relation to the intertidal zone down to MLWS at the landfall north of Easington Terminal, a 500 m buffer is proposed. An additional wider Study Area may also be considered. Specifically, a 15 km buffer offshore and along the shoreline, for the consideration of the dynamic environment. The 15 km buffer was informed by indicative tidal excursion ellipses from Atlas of UK Marine Renewable Energy Resources (Ref 18.34), which informed the typical extent of sediment transport within a tidal cycle in this coastal area.

Baseline Data Collection

Desk Study Sources

- 18.4.7 Baseline conditions of the Project were established during a desk study using the following sources:
- Environment Agency Flood Map for Planning (Ref 18.35).
 - Environment Agency long-term flood risk mapping (including flood risk from surface water and reservoirs) (Ref 18.36).
 - Environment Agency Recorded Flood Outlines (Ref 18.37).
 - Environment Agency Main River map (Ref 18.38).
 - Environment Agency Spatial Flood Defences dataset (Ref 18.39).
 - Association of Drainage Authorities IDB map (Ref 18.40).
 - Environment Agency Catchment Data Explorer (Ref 18.41).
 - Humber RBD River Basin Management Plan (RBMP) and 2021 consultation draft (Ref 18.42).
 - Environment Agency Water Quality Archive (Ref 18.43).
 - Defra Magic Map (Ref 18.44).
 - LiDAR data (Ref 18.45)
 - Aerial imagery.
 - Flood Estimation Handbook (FEH) Web Service (Ref 18.46).
 - Selby Level 1 (Ref 18.47).
 - East Riding of Yorkshire Level 1 SFRA (Ref 18.48).
 - North and North East Lincolnshire SFRA (Ref 18.49).
 - West Lindsey SFRA (Ref 18.50).
 - East Riding Integrated Coastal Zone Management Plan (Ref 18.51).

- 18.4.8 In addition, data requests have been made to the Environment Agency to provide information on the following to support the assessment:
- Information on historical flood events.
 - Modelled flood water levels and flood extent data for the watercourses within the Study Area, with a partial response, detailed below, received to date.
 - Information will be sought on historical coastal erosion data for the stretch of the Holderness coast in the vicinity of Easington Terminal. Specifically in relation to the Dimlington Cliffs SSSI.
- 18.4.9 IDBs within the Study Area include the following: Witham & Humber Drainage Boards; Shire Group, Yorkshire & Humber Drainage Boards; Lindsey Marsh Drainage Board; Doncaster East IDB; South Holderness IDB and Thorntree IDB. Requests for information on land drainage management regimes and data have been made to these Boards.
- 18.4.10 The Environment Agency have provided information from the following flood models:
- Burstwick Drain 2015.
 - East Halton Beck 2019.
 - Humber Hull Frontages 2015.
 - Humber North Banks 2011.
 - Thorngumbald (Humber Tribs) 2020.
 - Northern Area Tidal Model 2010.
 - Upper Humber 2013.
 - River Humber North Bank Tidal Modelling 2012 - 2015.
- 18.4.11 All of the information received has been incorporated into the baseline environment description in Section 18.5. Data from the models provided by the Environment Agency, such as detailed flood maps, information on defences and modelled flood levels, has been used to inform the assessment whilst more detailed information (model outputs) would be used to inform the FRA where required.

Site Visits and Surveys

- 18.4.12 No specific site visits have been undertaken to date.
- 18.4.13 A general walkover survey of the terrestrial Study Area is proposed to inform the EIA and ground-truth the desk study data. The walkover will focus on proposed AGI sites and visual observations will be made to improve the

understanding of local topography, land drainage regimes and watercourse conditions.

- 18.4.14 Relevant data from ecology surveys and drainage surveys will also be drawn from to inform the assessment.
- 18.4.15 In April 2025 a Phase 1 site walkover and Phase 2 site survey of the intertidal area at the Easington landfall was undertaken down to MLWS. The preliminary results of this have been summarised within Chapter 20: Coastal Processes.

Impact Assessment Methodology

- 18.4.16 This section sets out the methodology used for assessing the effects on Hydrology and Land Drainage for those aspects scoped into the assessment, as set out within the EIA Scoping Report (Ref 18.52) and agreed within the Scoping Opinion (EN0710003).
- 18.4.17 All assessment work has applied a precautionary principle, in that where limited information is available (in terms of the proposals for the Project), a realistic worst-case scenario is assessed.
- 18.4.18 A value (sensitivity) is assigned, then a magnitude of impact, then a significance of effect as described in the following sub-sections of this chapter. The assessment methodology draws from LA113, part of the DMRB (Ref 18.24). Whilst primarily intended for use in assessing the effects of highways projects on the water environment, the methodology is widely accepted as suitable for assessing the effects of other types of linear infrastructure projects on water environment receptors. The method promotes assessment that is proportionate to the scale and nature of the proposals and that considers the sensitivity of the local water environment to change.
- 18.4.19 LA113 does not provide a prescriptive assessment methodology for hydromorphology. The criteria within Table 18-6 and Table 18-7, covering hydromorphology, are drawn from published literature, namely the 'Guidebook of Applied Fluvial Geomorphology' (Ref 18.53) and the 'River Hydromorphology Assessment Technique Training Manual' (Ref 18.54).
- 18.4.20 The assessment in this chapter assumes that all mitigation - embedded (design measures), standard practice, and any additional mitigation measures (as defined in Chapter 2: Project Description) are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (Ref 18.55) and the EIA Scoping Report.

Sensitivity

- 18.4.21 The criteria for assigning the value / sensitivity of Hydrology and Land Drainage receptors are shown in Table 18-6. These values are based on Table 3.70 of LA113 (Ref 18.24).

Table 18-6 – Value / Sensitivity Criteria

Importance	Typical Criteria	Typical Examples	
Very High	Nationally significant attribute of high importance	Surface Water	Watercourses having a WFD classification shown in a RBMP and $Q95^* \geq 1.0\text{m}^3/\text{s}$. Site protected / designated under European Commission (EC) or United Kingdom (UK) legislation (Special Area for Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI), Ramsar site, salmonid water) / Species protected by EC legislation.
		Flood Risk	Essential infrastructure or highly vulnerable development (Ref 18.56).
		Hydromorphology	Varied morphological features with no sign of channel modification, displaying natural flow regime and fluvial processes. Sediment regime that is in equilibrium and provides a diverse mosaic of habitat types suitable for species sensitive to changes in turbidity.
High	Locally significant attribute of high importance	Surface Water	Watercourse having a WFD classification shown in a RBMP and $Q95$ flow (indicative of a summer low flow condition) $< 1.0\text{m}^3/\text{s}$. Species protected under EC or UK legislation.
		Flood Risk	More vulnerable development.

Importance	Typical Criteria	Typical Examples	
		Hydromorphology	Predominantly natural water feature with a range of morphological features. Limited signs of artificial modifications. Sediment regime that provides suitable habitat for species sensitive to changes in turbidity (e.g. migratory salmon, freshwater pearl mussel).
Medium	Of moderate quality and rarity	Surface Water	Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m ³ /s.
		Flood Risk	Less vulnerable development.
		Hydromorphology	Water feature with channel cross-section partially modified in places but exhibiting some morphological features. Varied flow types but with an obviously impacted natural flow regime. Sediment regime that provides some physical habitat for species sensitive to changes in turbidity.
Low	Lower quality	Surface Water	Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m ³ /s.
		Flood Risk	Water compatible development.
		Hydromorphology	Water feature that has been extensively modified. Exhibits limited to no morphological diversity, with uniform flow, bed and bank profiles and low energy. Sediment regime that provides for very limited physical habitat for species sensitive to changes in turbidity.

**The Q95 is the flow equalled or exceeded 95% of the time and is typical of a summer flow.*

Magnitude of Effect

- 18.4.22 The magnitude of impact considers the expected scale, extent and duration of change. Impact magnitude has been assigned based on the criteria shown in Table 18-7. The criteria are based on Table 3.71 of LA113 (Ref 18.24).

Table 18-7 – Impact Magnitude Criteria

Importance	Typical Criteria	Typical Examples	
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.
		Flood Risk*	Increase in peak flood level (>100mm).
		Hydromorphology	Significant impacts on the bed, banks, and vegetated riparian corridor, resulting in changes to sediment transport, load, and turbidity. Significant shift away from baseline conditions at the water body scale.
Moderate adverse	Results in effect on 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.
		Flood Risk*	Increase in peak flood level (> 50mm).
		Hydromorphology	Some changes to bed, banks and vegetated riparian corridor, resulting in some changes to sediment transport, load, and turbidity at the multi-reach scale.
Minor adverse	Results in some measurable change in	Surface Water	Potential for a low risk of pollution. Minor effects on abstractions.
		Flood Risk*	Increase in peak flood level (> 10mm).

Importance	Typical Criteria	Typical Examples	
	attributes, quality or vulnerability	Hydromorphology	Limited impacts on bed, banks, and vegetated riparian corridor resulting in limited changes to sediment characteristics.
Negligible	Results in effect in attribute, but of insufficient magnitude to affect the use or integrity	The Project is unlikely to affect the integrity of the water environment.	
		Surface Water	No measurable change.
		Flood Risk*	Negligible change to peak flood level ($< \pm 10\text{mm}$).
		Hydromorphology	Minimal or no measurable change from baseline conditions. Any impacts highly localized; no impacts at the reach scale.
Minor beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.	Surface Water	Minor contribution to improvement in water body WFD classification.
		Flood Risk*	Creation of flood storage and decreased in peak flood level ($>10\text{mm}$).
Moderate beneficial	Results in moderate improvement of attribute quality	Surface Water	Moderate contribution to improvement in water body WFD classification.
		Flood Risk*	Creation of flood storage and decrease in peak flood level ($> 50\text{mm}$).
Major beneficial		Surface water	Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse.

Importance	Typical Criteria	Typical Examples	
	Results in major improvement of attribute quality		Improvement in water body WFD classification.
		Flood risk*	Creation of flood storage and decrease in peak flood level (<100mm).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.		

**These will be refined as necessary for the ES following engagement with the EA.*

Significance

- 18.4.23 The significance of an effect is assessed using professional judgement considering the sensitivity (or value) of the receptor within the Study Area, and the magnitude of change (impact) likely to be caused by the activities of the Project. These factors are combined to give an overall significance of effect.
- 18.4.24 Significance has been derived using the matrix set out in Table 18-8. This has been supplemented by professional judgement which, where applicable, has been explained to give the rationale behind the values assigned. Significant effects, in the context of the EIA Regulations, are effects of moderate or greater significance.

Table 18-8 – Significance Matrix

Environmental Value / Sensitivity	Magnitude of impact					
		No change	Negligible	Minor	Moderate	Major
	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Slight or 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

Assumptions and Limitations

- 18.4.25 The assessment depends on the accuracy of data provided by third parties. It has therefore been assumed that data provided by third parties is accurate.
- 18.4.26 No quantitative assessments (modelling) and no water-quality sampling and analysis has been undertaken to date, as it is considered that sufficient baseline data are available to generally characterise land drainage conditions and the water quality of surface water receptors within the Study Area. Where

necessary, updates to EA flood models would be made to generate robust data to inform the EIA and Flood Risk Assessment.

- 18.4.27 All conclusions and assessments reported in the PEIR are by their nature preliminary. All assessment work has applied, and continues to apply, a precautionary principle, in that where limited information is available (in terms of the proposals for the Project), a realistic worst-case scenario is assessed.
- 18.4.28 The key parameters and assumptions will be reviewed based on the final design and, where required, updated or refined. The ES will present the final key parameters and assumptions used within that assessment, particularly drawing attention to any areas that may have evolved from what is presented in this preliminary assessment.
- 18.4.29 The water supply strategy for the Project is evolving, in consultation with all key stakeholders. The preliminary assessment of effects presented is based on the assumption that there will be no new consumptive abstractions from local water resources to supply the Projects water needs.
- 18.4.30 Methodologies for crossing watercourses for both installation of the pipeline and for construction access have not yet been finalised. The preliminary assessment of effects presented is based on the assumption that Environment Agency main rivers and large IDB 'main drains' would be crossed using trenchless techniques for pipeline installation and open span bridges for access, with smaller, ordinary watercourses being crossed using open culvert methods and culverted for access. Assessments will be refined for the ES when methodologies are confirmed.
- 18.4.31 The assessment with respect to the intertidal environment has been undertaken with the best available data, at the time of writing. Additional information from recent surveys undertaken for the Project (i.e., Phase 1 and 2 surveys) have been fed into the assessment where relevant and will be presented at ES.

18.5 Baseline Conditions

Existing Baseline

- 18.5.1 The baseline provides a characterisation of the Study Area in terms of hydrological and land drainage setting. To provide geographical context, the Project has been split into three sections detailed in Chapter 2 Project Description, illustrated in Volume 3 - Figure 1.1: Project Location and summarised below:

- Section 1 – From the Drax area in the west to the River Trent.
- Section 2 – From the River Trent to the eastern bank of the Humber.
- Section 3 – From the eastern bank of the Humber to MLWS on the coast north of Easington, with a spur line running north between Paull and Thorngumbald as well.

- 18.5.2 Watercourses in the Study Area are shown in Volume 3 - Figure 18.1: Surface Water Features and Study Area. A summary table of WFD status data for the watercourses described in the following sections can be found in Volume 4 - Appendix 18.2: WFD 1&2. A summary of baseline data relating to watercourses, their water quality and hydromorphology is presented below by Project sections.
- 18.5.3 A summary of the baseline information for flood risk and land drainage is also provided below by Project sections. More detail on specific flood risk at key locations will be included within the FRA supporting the ES.
- 18.5.4 Volume 3 – Figure 18.2: Flood Zones shows the extents of Flood Zones 2 and 3 within the Study Area and Volume 3 – Figure 18.3 shows the areas at risk of surface water flooding.
- 18.5.5 Baseline conditions have been gathered from desk-based information.
- 18.5.6 In addition, where relevant, to capture the intertidal baseline sufficiently with respect to hydrology, cross reference to the existing Offshore Environmental Statement has been made, alongside best available desk-based information at the time.

Sites Designated for Nature Conservation Interest

- 18.5.7 As detailed in Chapter 7: Ecology and Biodiversity, there are numerous sites designated for nature conservation interest within the Study Area. Where surface waters play a key role in sustaining the designated interest features, these sites are included as Hydrology and Land Drainage receptors. The Project ecologists have identified the sites this applies to, and these are summarised in Table 7-8 of Chapter 7: Ecology and Biodiversity.
- 18.5.8 Further detail on these sites is included in Volume 4 - Appendix 7.1: Ecological Appraisal.
- 18.5.9 Groundwater Dependent Terrestrial Ecosystems (GWDTEs) are addressed separately in Chapter 10: Ground Conditions and Hydrogeology.

Existing Water Interests (Surface Water Abstractions and Discharges)

- 18.5.10 Existing consented discharges to surface water and licensed abstractions from surface water sources have been requested from the Environment Agency and local planning authorities and are summarised in Volume 4 - Appendix 18.1: Hydrology and Land Drainage Baseline Data. Information on groundwater abstractions is included in Chapter 10: Ground Conditions and Hydrogeology.

Section 1 – Drax to the River Trent

Watercourses, their Water Quality and Hydromorphology

- 18.5.11 Within Section 1 the following watercourses would be crossed by the draft Order Limits, from west to east:
- River Ouse (main river).
 - Dam Dike.
 - Goose House Drain.
 - River Aire.
 - Dutch River (River Don) (main river).
 - New Drain.
 - Swinefleet Warping Drain.
 - Eastoft Moors Drain.
 - Bewcarrs Drain.
 - Adlingfleet Drain
 - Sheffield and South Yorkshire Navigation Canal.
 - North Soak Drain.
 - South Soak Drain.
 - River Trent (main river).
 - Numerous minor and unnamed land drains.
- 18.5.12 The Aire and Calder Navigation canal is also crossed by the draft Order Limits adjacent to Dutch River (River Don).
- 18.5.13 The following watercourses are not within the draft Order Limits but are located within the Study Area for Section 1:
- Tributary of Dutch River.
 - Langham Drain.
 - Dobeller Drain.

- Pasture Drain.
- Hatfield Waste Drain.
- North Engine Drain.
- South Engine Drain.
- Three Rivers.
- River Torne.
- Numerous minor and unnamed land drains.

- 18.5.14 The watercourses all ultimately drain to the Humber Estuary and those that are crossed by the draft Order Limits typically flow in a west to east direction. Their catchments vary from small, rural catchments to larger catchments covering urban areas such as Knottingley, Doncaster, Goole and Throne. Land use within the majority of the Study Area for Section 1 is rural, with some industrial land at the end of the southern fork of the draft Order Limits around Keadby Power Station. The land is served by a network of land drains and has typically flat topography.
- 18.5.15 The River Ouse and River Don main rivers are included within the Humber RBMP (Ref 18.42). There are 10 surface water WFD waterbodies and one transitional WFD waterbody within the Study Area for Section 1. Baseline WFD data for these catchments are summarised in Volume 4 - Appendix 18.2: WFD 1&2 and illustrated in Volume 3 – Figure 18.1: Surface Water Features and Study Area. The WFD classifications for the waterbodies are informed by monitoring a range of parameters that are indicators of water quality from Environment Agency monitoring sites.
- 18.5.16 The surface waterbodies in Section 1 share similar quality characteristics: they all share a moderate ecological status and a failing chemical status. There are multiple Reasons for Not Achieving Good (RNAG) status such as modification for flood protection, poor soil management, sewage discharges, poor nutrient management and land drainage. The hydromorphological designation of each of the surface and transitional waterbodies are all either heavily modified or artificial. Many of the ordinary watercourses in the Study Area also serve a land drainage function and have a relatively low hydromorphological diversity, typically having uniform channel profiles and straightened channel forms.
- 18.5.17 The majority of the Section 1 Study Area is not located within a Surface Water Drinking Water Safeguard Zone. A small area at the western end of the draft Order Limits, approximately 1 km north of the River Ouse, is located within the Elvington & Loftsome Bridge Drinking Water Safeguard Zone (SWSGZ6008).

- 18.5.18 Section 1 of the Study Area is predominantly situated within a number of Nitrate Vulnerable Zones (NVZs), relating to surface waters. These zones are illustrated in Volume 3 – Figure 18.1: Surface Water Features and Study Area and listed below:
- Aire from River Calder to River Ouse NVZ.
 - Lower Don NVZ.
 - Swinefleet Warping Drain Source to River Ouse NVZ.
 - Burton Stather Drain NVZ.
 - Adlingfleet Drain Upper Catchment NVZ.
 - Paupers Drain Catchment NVZ.
 - North Soak Drain NVZ.
 - River Torne / Three Rivers from Mothers Drain to River Trent NVZ.
- 18.5.19 Details of groundwater bodies within the Study Area of Section 1 are included in Chapter 10: Ground Conditions and Hydrogeology.

Flood Risk

- 18.5.20 According to the Environment Agency Flood Map for Planning (Ref 18.35), the draft Order Limits are located almost entirely within Flood Zone 3 (high risk), equivalent to an annual flood risk from rivers of 1 in 100 (1%) or greater; or an annual flood risk from the sea of 1 in 200 (0.5%) or greater. The exception to this are the small areas (less than 5% of the draft Order Limits in this section) of higher ground in the vicinity of the Keadby Above Ground Installation (AGI) station, as well as small areas south of the Drax AGI and along the north west of the draft Order Limits near Asselby, which are within Flood Zone 1 (low risk), equivalent to an annual flood risk from rivers and the sea of less than 1 in 1000 (0.1%). The rest of the AGI options in Section 1 are all within Flood Zone 3.
- 18.5.21 The main rivers within Section 1 have flood defences along both banks for their entire reach through Study Area, consisting of embankments and flood walls. It is likely that the majority of the areas in Flood Zone 3 within this section would benefit from flood defences; the Environment Agency Reduction in Risk of Flooding from Rivers and Sea due to Defences mapping (Ref 18.35) shows these areas, and an updated dataset will be used to inform the ES.
- 18.5.22 The Risk of Flooding from Surface Water map (Ref 18.35) shows the majority of land within the Study Area in Section 1 is at very low risk of surface water flooding (annual chance of flooding of less than 0.1%), with localised areas along the route at a high to low risk of surface water flooding (annual chance of flooding greater than 0.1% (1 in 1000)). The mapping shows that at the

proposed AGI locations and construction compounds, the land is predominantly at a very low risk of surface water flooding, with localised areas $\geq 100\text{m}^2$ at a high risk (annual chance of flooding greater than 3.3% (1 in 30)) of surface water flooding. Volume 3 – Figure 18.3: Risk of Flooding from Surface Water illustrates this and a summary of the surface water flood risk at each AGI is listed below:

- Drax – very low risk with approximately 350m^2 at a low risk and $1,000\text{m}^2$ at a high risk.
- Rawcliffe Bridge – very low risk with approximately 200m^2 at a low risk.
- Eastoft – very low risk with approximately $2,000\text{m}^2$ at a low risk, 800m^2 at a medium risk and 500m^2 at a high risk.
- Keadby – very low risk with approximately $2,800\text{km}^2$ at a low risk, 650m^2 at a medium risk and 550m^2 at a high risk.

18.5.23 The Recorded Flood Outline dataset (Ref 18.37) shows that the following areas within the Study Area have previously flooded, the reported cause of the flooding is noted in brackets for each event where this information is available:

- March 1947 – channel capacity of River Trent exceeded due to no raised defences, restricted to River Trent in Study Area.
- January / February 1995 flood event – flood outline restricted to main rivers and land adjacent to and within approximately 40 m of main rivers (overtopping of defences, channel capacity exceeded).
- Autumn 2000 flood event – flood outline restricted to the River Ouse and land within approximately 30 m of the River Ouse (overtopping of defences).
- December 2000 flood event – isolated area of flooding from the River Aire in Snaith, between the River Aire and Wakefield and Goole railway line.
- June 2007 flood event (main river) – flood outline restricted to the River Aire and land between the River Aire and Rawcliffe Road, the River Don (Dutch River) and land within 300 m of the River Don (cause unknown).
- June 2007 flood event (surface water) – flood outline covers several small, isolated areas of land between the River Don (Dutch River) and Drax (surface water).
- June 2013 flood event – tidal flooding from the River Ouse restricted to the River Ouse and floodplain north of the river between Old Goole and Reedness.
- December 2013 – overtopping of River Trent defences limited to small areas of Keadby to the west of Keadby substation, with a flood outline mainly following roads.

- November 2019 – flood extent restricted to within 10 m of the River Don (Dutch River) (channel capacity exceeded).
- February 2020 flood event, Storm Dennis (main river) – flood outline limited to main rivers and typically land within 10 m of the main rivers (channel capacity exceeded).
- February 2020 flood event, Storm Dennis (surface water) – flood outline covers several small, isolated areas of land between the River Aire and Eastoft (local drainage / surface water).

Section 2 – River Trent to the Eastern bank of the Humber

Watercourses, their Water Quality and Hydromorphology

- 18.5.24 Within Section 2 the following watercourses would be crossed by the draft Order Limits, from west to east:
- Winterton Beck.
 - Halton Drain (main river).
 - Winterton Ings Drain.
 - West Drain (main river).
 - New River Ancholme (main river).
 - East Drain (main river).
 - Marsh Drain.
 - Butforth Drain.
 - East Halton Beck (main river).
 - Carr Gutter.
 - Main Drain.
 - River Humber (main river).
 - Numerous minor and unnamed land drains.
- 18.5.25 The following watercourses are not within the draft Order Limits but are located within the Study Area for Section 2:
- Unnamed tributaries of the River Humber.
 - Skitter Beck.
 - Numerous minor and unnamed land drains.
- 18.5.26 The watercourses all ultimately drain to the Humber Estuary and those that are crossed by the draft Order Limits typically flow in a south to north or south-west to north-east direction. Their catchments vary from small, rural catchments to larger catchments covering urban areas such as Brigg and Immingham. Land use within the majority of the Study Area for Section 2 is rural, with some hardstanding and industrial land at the eastern end of Section 2 at the Humber

Sea Terminal. The land at the eastern end of Section 2 around East Halton is again dominated with land drains, with fewer in the western end due to more varied topography.

- 18.5.27 The New River Ancholme is included within the Humber RBMP (Ref 18.42). There are five surface water WFD waterbodies and two transitional WFD waterbodies within the Study Area for Section 2. Baseline WFD data for these catchments are summarised in Volume 4 - Appendix 18.2: WFD 1&2 and illustrated in Volume 3 – Figure 18.1: Surface Water Features and Study Area.
- 18.5.28 Three of the surface waterbodies and both transitional waterbodies in Section 2 have a moderate ecological status, one surface waterbody a poor ecological status (Barrow Beck) and one bad ecological status (Skitter Beck / East Halton Beck). All of the WFD waterbodies in Section 2 have a failing chemical status. There are multiple RNAGs including modification for flood protection, land drainage, sewage discharge, poor livestock management and urbanisation. The hydromorphological designation of each of the surface and transitional waterbodies are all either heavily modified or artificial. Many of the ordinary watercourses in the Study Area, especially at the eastern end of Section 2, also serve a land drainage function and have a relatively low hydromorphological diversity, typically having uniform channel profiles and straightened channel forms.
- 18.5.29 The Section 2 Study Area is not located within a Surface Water Drinking Water Safeguard Zone.
- 18.5.30 Section 2 of the Study Area is predominantly situated within several NVZs relating to surface water, as illustrated in Volume 3 – Figure 18.1: Surface Water Features and Study Area. These zones are detailed as follows:
- Winterton Beck from Source to the Humber NVZ.
 - Burton Stathers Drain NVZ.
 - Ancholme from Bishopbridge to the Humber NVZ.
 - Barrow Beck NVZ.
 - Skitter Beck / East Halton Beck NVZ.
 - North Beck Drain NVZ.
- 18.5.31 Details of groundwater bodies within the Study Area of Section 2 are included in Chapter 10: Ground Conditions and Hydrogeology.

Flood Risk

- 18.5.32 According to the Environment Agency Flood Map for Planning (Ref 18.35), much of the draft Order Limits are located within Flood Zone 1 (low risk), with localised areas in Flood Zone 3 associated with the main rivers and larger ordinary watercourses. Flood Zone 3 areas include an approximately 3.5km stretch of the draft Order Limits associated with New River Ancholme between Winterton and Horkstow; 50m stretch adjacent to Thronton Road; 800m stretch associated with the East Halton Beck around the East Halton AGI; 600m associated with the East Halton Beck north-west of East Halton, and all access roads on the eastern extent of Section 2, associated with the River Humber. All AGI options in Section 2 are within Flood Zone 1.
- 18.5.33 Flood defences within the Study Area, along Winterton Beck, West Drain, New Ancholme River, East Drain, Skitter Beck and East Halton Beck, comprise predominantly natural high ground with some embankments. It is likely that the majority of the areas in Flood Zone 3 within this section would benefit from flood defences; the Environment Agency Reduction in Risk of Flooding from Rivers and Sea due to Defences mapping (Ref 18.35) shows these areas, and an updated dataset will be used to inform the ES.
- 18.5.34 The Risk of Flooding from Surface Water map (Ref 18.35) shows the majority of land within the Study Area in Section 2 is at very low risk of surface water flooding with localised areas along the route at a higher risk of surface water flooding. The mapping shows that all bar one of the proposed AGI sites in Section 2 are at a very low risk of surface water flooding. The Immingham AGI is partially (approximately >22,000m²) at a high risk, associated with a surface water flow path. Smaller isolated areas of low risk are also present across this site. Volume 3 – Figure 18.3: Risk of Flooding from Surface Water illustrates the flood extents.
- 18.5.35 The Recorded Flood Outline dataset (Ref 18.37) shows that the following areas within the Study Area have previously flooded:
- February 1953 – overtopping of Humber defences with a flood extent along the western bank between East Halton and Immingham.
 - May 2013 – overtopping of Humber defences with a flood extent along the southern bank floodplain between Whitton and East Halton.
 - November 2019 – overtopping of defences with a flood extent between West Drain and New River Ancholme.

Section 3 – Eastern bank of the Humber to Easington coast, including Spur Line between Paull and Thorngumbald

Watercourses, their Water Quality and Hydromorphology

- 18.5.36 Within Section 3 the following watercourses would be crossed by the draft Order Limits, from west to east:
- Thorngumbald Drain (main river).
 - Hedon Haven (main river).
 - Ryhill Old Drain.
 - Keyingham Drain (main river).
 - Winestead Drain (main river).
 - Old Hive Dike.
 - Numerous minor and unnamed land drains.
- 18.5.37 The following watercourses are not within the draft Order Limits but are located within the Study Area for Section 3:
- Punda Drain.
 - Old Fleet (main river).
 - Numerous minor and unnamed land drains.
- 18.5.38 The watercourses all ultimately drain to the Humber Estuary and those that are crossed by the draft Order Limits typically flow in a north to south or north-east to south-west direction. Their catchments vary from small, rural catchments to medium sized catchments covering urban areas such as Hedon and Withernsea. Land use within the majority of the Study Area for Section 3 is rural, with the exception of the western-most area at Hay Marsh, which is industrial. As with Section 1, the land within the Study Area in Section 3 is served by a network of land drains.
- 18.5.39 There are five surface water WFD waterbodies and three Transitional and Coastal (TraC) WFD waterbodies within the Study Area for Section 3. These TraC waterbodies cover the waterbodies themselves and some terrestrial areas (in this case draining to the Humber Lower and Yorkshire South WFD waterbodies). Baseline WFD data for these catchments are summarised in Volume 4 - Appendix 18.2: WFD 1&2 and illustrated in Volume 3 – Figure 18.1: Surface Water Features and Study Area.
- 18.5.40 All of the WFD waterbodies in Section 3 have a moderate ecological status and a failing chemical status. There are multiple RNAGs including modification for land drainage, poor nutrient and soil management and sewage discharge. The

hydromorphological designation of each of the surface and transitional waterbodies are all either heavily modified or artificial. Many of the ordinary watercourses in the Study Area also serve a land drainage function and have a relatively low hydromorphological diversity, typically having uniform channel profiles and straightened channel forms.

- 18.5.41 The Section 3 Study Area is not located within a Surface Water Drinking Water Safeguard Zone.
- 18.5.42 Section 3 of the Study Area is predominantly situated within a number of NVZs relating to surface water as illustrated in Volume 3 – Figure 18.1: Surface Water Features and Study Area. These zones are detailed as follows:
- Sands / Keyingham / Roos Drain from Source to Humber NVZ.
 - Wyton Drain / Sproatley Dr from Source to Humber NVZ.
 - Burstwick Drain from Source to Humber NVZ.
 - Winestead Drain from Source to Humber NVZ.
- 18.5.43 Details of groundwater bodies within the Study Area of Section 3 are included in Chapter 10: Ground Conditions and Hydrogeology.

Flood Risk

- 18.5.44 According to the Environment Agency Flood Map for Planning (Ref 18.35), much of the land within the draft Order Limits, from the River Humber north bank to Patrington, is located within Flood Zone 3. Between Patrington and the Easington landfall, the draft Order Limits are located within Flood Zone 1. The Thorngumbald and Salt End AGI options are located in Flood Zone 3, however the Patrington AGI and Easington Pump Facility are located in Flood Zone 1.
- 18.5.45 Flood defences within the Study Area along Old Fleet, Hedon Haven, Thorngumbald Drain, River Humber north bank, Keyingham Drain and Winstead Drain comprise natural high ground inland and embankments along the Humber Estuary. It is likely that the majority of the areas in Flood Zone 3 within this section would benefit from flood defences; the Environment Agency Reduction in Risk of Flooding from Rivers and Sea due to Defences mapping (Ref 18.35) shows these areas, and an updated dataset will be used to inform the ES.
- 18.5.46 The Risk of Flooding from Surface Water map (Ref 18.35) shows the majority of land within the Study Area in Section 3 is at very low risk of surface water flooding with localised areas along the route at higher risk from this source, with some surface water flow paths present in the eastern end of the section. The

mapping shows that at the proposed AGI and Pumping Station locations and construction compounds, the land is predominantly at a very low risk of surface water flooding, with localised areas $\geq 50\text{m}^2$ at a high risk of surface water flooding. Volume 3 – Figure 18.3: Risk of Flooding from Surface Water illustrates this and a summary of the surface water flood risk at each AGI is listed below:

- Salt End AGI – very low risk with approximately 400m^2 at a low risk.
- Thorngumbald AGI – very low risk with approximately 200m^2 at a low risk.
- Patrington AGI – very low risk with approximately 300m^2 at a low risk, 80m^2 at a medium risk and 120m^2 at a high risk.
- Pumping Station – very low risk with approximately $3,300\text{m}^2$ at a low risk, 300m^2 at a medium risk and 700m^2 at a high risk.

18.5.47 The Recorded Flood Outline dataset (Ref 18.37) shows that the following areas within the Study Area have previously flooded:

- February 1953 – overtopping of fluvial defence at Paull, the flood extent covers the Salt End AGI.
- January 1969 - fluvial flood extent concentrated along the floodplain of the Winestead Drain, from exceeded channel capacity prior to raised defences.
- January 1969 – surface water flood extent resulting from drainage, south of Thorngumbald.
- June 2007 – fluvial flood extent concentrated along the floodplain of the Winestead Drain.
- June 2007 – surface water flood extent in the vicinity of the Patrington construction compound, and in localised flood extents between Paull and Ottringham along the draft Order Limits.

Intertidal Baseline

18.5.48 The following receptors have been identified for the intertidal environment that may be impeded by impacts to water quality:

- Surface waterbodies (i.e. Humber Estuary).
- WFD waterbodies (i.e. Yorkshire South Water Body (GB640402491000)).
- Coastal floodplain (defined by the extents of EA Flood Zones 2 and 3a).
- Designated areas with intertidal / marine qualifying features.

18.5.49 A full assessment on designated sites has been provided within Chapter 7: Ecology and Biodiversity and Chapter 10: Ground Conditions and Hydrogeology for the relevant receptors. They will further be assessed as part

of the Habitats Regulations Assessment (HRA) and Marine Conservation Zone (MCZ) Assessment

Waterbodies

- 18.5.50 The Easington landfall is located within the Yorkshire South coastal WFD water body (GB640402491000), which extends from Flamborough Head in the north to Spurn Point in the south. The surface area covers up to 163.12 km² and is designated as a Heavily Modified Water Body (HMWB) due to its role in coastal protection, flood defence, and navigation activities associated with ports and harbours (Ref 18.41).
- 18.5.51 A summary of the Yorkshire South baseline WFD data is summarised in Volume 4 - Appendix 18.2: WFD 1&2 and illustrated in Volume 3 – Figure 18.1: Surface Water Features and Study Area.
- 18.5.52 This water body has an overall moderate ecological status, however failed on chemical quality due to the presence of Benzo(g-h-i)perylene, mercury and its compounds, Polybrominated diphenyl ethers (PBDE) and Tributyltin Compounds. The water body has further been subject to flood and coastal protection (Ref 18.57).
- 18.5.53 The WFD objective aims to achieve ‘good’ overall status by 2027. However, there is ‘low confidence’ of this due to associated costs.
- 18.5.54 The Humber Lower WFD Water Body also overlaps with areas down to MLWS of relevance to the intertidal environment; a summary of WFD data for the water body is presented in Volume 4 - Appendix 18.2: WFD 1&2. This water body has a moderate ecological status overall, however failed on chemical quality due to the presence of the following (Ref 18.58):
- Benzo(a)pyrene.
 - Benzo(b)fluoranthene.
 - Benzo(g-h-i)perylene.
 - Mercury and its compounds.
 - Perfluorooctane sulphonate (PFOS).
 - Polybrominated diphenyl ethers (PBDE).
 - Tributyltin Compounds.
 - Cypermethrin (Priority).
 - Dichlorvos (Priority).

- 18.5.55 Further reasons for the water body not achieving ‘good’ status are associated with modification for coastal and flood risk protection and a summary of the WFD classification data is outlined below (Ref 18.58).
- 18.5.56 Water quality in the Humber Estuary is influenced by both natural and anthropogenic factors. Over recent decades, estuarine water quality has improved due to enhanced wastewater treatment and industrial regulations. However, turbidity levels remain high due to fine sediment influx from river discharge and tidal action. High turbidity levels are characteristic of the estuary, affecting light penetration, oxygen levels, and primary productivity, with impacts on aquatic ecosystems and habitats such as intertidal mudflats. Additionally, localised contamination sources, such as agricultural runoff (i.e., nutrients, pesticides and other pollutants) and urban discharge can further influence water quality. These inputs are particularly pronounced following heavy rainfall events (Ref 18.59).
- 18.5.57 For watercourse receptors (where applicable) and the intertidal zone, WFD status data will be collected to characterise existing qualities and status objectives, as well as any measures identified to achieve these measures. Existing surface water interests (abstractions and discharges) will be identified with reference to Environment Agency consent / permit registers (Ref 18.59). Areas of fluvial / coastal floodplain will be described using flood model data and existing flood defence assets will be identified. Other sources of flood risk, such as from surface water, groundwater and artificial sources, will be characterised in consultation with the LLFAs and with reference to relevant Strategic FRA and other published sources.

Future Baseline

- 18.5.58 Flood risk and drainage within the Study Area are expected to be influenced by climate change through impacts on rainfall intensities and peak river flows. These future conditions would be considered to factor in climate change resilience into the Project design.
- 18.5.59 For the relevant Environment Agency management catchments, peak rainfall intensity is anticipated to increase between 20% (central estimate) and 40% (upper end estimate) over the 25-year design lifetime of the Project. Peak river flows and tide levels are also anticipated to increase due to the impacts of climate change over the Project’s lifetime.
- 18.5.60 Hydrological conditions in the Humber Estuary area are expected to evolve due to sea-level rise, increased storm surges, and changing precipitation patterns.

These factors may lead to more frequent tidal inundation and potentially larger tidal ranges, which may affect sediment stability, water quality, and habitat conditions in the intertidal area. The increased frequency of storm surges would likely result in more substantial saltwater intrusion and brackish water encroachment further upstream, altering salinity gradients and impacting estuarine habitats.

- 18.5.61 The Easington landfall is located on a rapidly eroding coastline, retreating on average at a rate of 1.37m per year, but with larger independent losses of up to 11.5m. The underlying geology is of chalk overlain by a glacial till of soft boulder clay that can be rapidly eroded when saturated. It is this material that makes up much of the cliffs above Mean High Water Springs (MHWS). Evidence of recent cliff erosion can be seen in the observations from the intertidal survey at the Easington landfall. The rate at which the cliffs are eroding is evidenced in the vicinity of the proposed landfall at Easington within the Dimlington Cliff SSSI as well as further north, where much evidence of the cliffs slumping in sections was observed, undercutting of the cliffs by wave action, large sections of cliff fall and material from the cliffs scattered on the shoreline throughout the intertidal area.
- 18.5.62 In addition to retreat of the coastline, there is also a lowering of the shoreline profile. An assessment of coastal erosion and reduction of beach profile will be developed further at ES with the use of best available data at the time. Additional cross reference will be made to the Offshore Environmental Statement, where relevant.
- 18.5.63 To the south of the proposed landfall, and immediately to the north of the Easington terminal sea defences, the shoreline has a noticeably raised profile due to a degree of accumulation of sediments from littoral transport caused by the terminal sea defences. Coastal erosion here is reduced in comparison with the coastline immediately to the north. The ongoing maintenance of the sea defences at Easington terminal would be considered in the ES.
- 18.5.64 The implementation of future cycles of WFD management plans driving future improvements in the ecological and chemical quality of waterbodies has been considered when assigning value to water environment resources and receptors.
- 18.5.65 Increased urban and industrial development may further increase stormwater runoff, which can alter sediment loads, degrade water quality, and enhance erosion within the estuary, leading to intensified shoreline modification, further reducing the natural buffering capacity of the intertidal zone against wave

action. This, combined with anticipated sea-level rise, could lead to accelerated coastline retreat near Easington.

- 18.5.66 Aligned with increased urban development, rising human population and industrial expansion in the Humber region may place increased demand on freshwater resources, potentially altering the hydrological balance within the estuary. Expanded agricultural and urban runoff may introduce more nutrients, contaminants, and suspended solids into the water system, increasing turbidity and potentially affecting intertidal habitat conditions.
- 18.5.67 In addition, stormwater infrastructure associated with urban and industrial expansion could alter local hydrodynamics by directing increased runoff volume into the estuary, leading to more frequent or intense flood events. Such shifts may change tidal dynamics and estuarine mixing, impacting the natural salinity gradients and potentially contributing to brackish water encroachment into freshwater areas. These changes could significantly alter sediment deposition, nutrient availability, and overall estuarine water quality, affecting both human and ecological receptors.
- 18.5.68 For further detail on coastal erosion risk and associated impacts please refer to Chapter 20: Coastal Processes.
- 18.5.69 Future baseline conditions will be updated within the ES.

18.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 18.6.1 Embedded measures are those that are intrinsic to and built into the design of the Project. Embedded measures relevant to Hydrology and Land Drainage are summarised below.
- Where possible, the AGIs and Pump Facility have been located outside areas of flood risk and sea level rise, including consideration of future climate change. However, given the linear nature of the Project and the expansive nature of the flood zones within the region, avoidance in all cases is not practicable.
 - For access roads and haul roads, the Project requires the crossing of multiple ditches, drains and watercourses. Large or sensitive watercourses, for example those designated as main river, and those with

WFD status, would be crossed by the temporary haul road using temporary clear span bridges.

- Surface water runoff from construction sites, haul roads and operational assets would be managed using SuDS techniques appropriate to local conditions.

Embedded Mitigation

- 18.6.2 Standard mitigation measures, comprising management activities and techniques, would be implemented during construction of the Project to limit effects through adherence to good site practices and achieving legal compliance.
- 18.6.3 The Register of Commitments (REAC) (Volume 4 – Appendix 4.2: REAC) contains relevant standard / good practice measures relating to Hydrology and Land Drainage. Measures have been assigned references, for ease of cross-reference.
- 18.6.4 These include but are not limited to measures that would control sources of potential pollution and prevent pathways to water environment receptors. These measures are listed in Table 18-9.

Table 18-9 – Embedded Mitigation

Ref	Measure	Project Phase	Responsible Party
HYD1	Where possible, AGIs and the Pump Facility will be located outside areas of flood risk. Where this has not been practicable, it is proposed that the Main Works Contractor (and others) would sign up to the Environment Agency's Floodline service whilst works within the floodplain are being undertaken. A Flood Risk Action Plan would be established containing appropriate evacuation procedures to be followed upon receipt of a flood warning. Further information on the Action Plan would be included in the Construction Environmental Management Plan (CEMP), an outline of which would be submitted with the ES.	Construction	Main Works Contractor
HYD2	Where pipelines would be routed under flood defence infrastructure monitoring of the structures is proposed at key locations (as agreed with the Environment Agency) to establish a pre-construction baseline and during construction and ensure no changes in their level and structural integrity. Engagement with the Environment Agency is also ongoing with reference to potential conflicts between the construction works and planned flood risk management projects and capital works in the vicinity of the draft Order. Once finalised, the exact location of the proposed pipelines and construction areas would be provided to the Environment Agency, with intended timings, to ensure that the schemes could co-exist.	Construction	Main Works Contractor
HYD3	Where construction activities take place in Flood Zone 3, construction compounds and other working areas will be laid out in accordance with the Sequential Test and incorporate flood resilience measures where necessary, for example incorporating raised bunds to prevent floodwater ingress into horizontal directional drilling (HDD) pits. Storage of construction equipment and materials will be done in such a way as to avoid forming barriers to floodplain flows. Material storage areas will be located outside of the fluvial floodplain where practicable.	Construction	Main Works Contractor
HYD4	Where additional mitigation of flood risk may be required, such as where drive pits for trenchless crossings are located in the floodplain (Flood Zone 3), suitable protection would be provided. Specific measures (such as raised earth bunds for example) would be determined as an outcome of the FRA that would be prepared in support of the ES and recorded within the Register of Commitments.	Construction	Main Works Contractor
HYD5	Where construction activities take place within surface water flood zones, prior to works commencing appropriate site drainage will be put in place to reduce the risk of standing water and avoid substantial delays to the construction programme.	Construction	Main Works Contractor
HYD6	Where construction haul roads pass within or cross floodplains, the haul road design will include for flood mitigation / drainage to allow for the flow of water within the floodplain. The design of the haul roads themselves will include for some resilience to flooding, for example, incorporating suitable geo-textiles to stabilise the road surfacing, as well as allowing water to flow within the floodplain. Suitable materials will be used to surface the haul roads. In some cases, bespoke construction methodologies may be used based on site constraints and ground conditions.	Construction	Applicant
HYD7	Where open cut crossings of main rivers are proposed, reinstatement works would be carried out to mitigate potential impacts on the conveyance, flow and hydromorphology of the watercourses, as well as mitigating detrimental impacts on the habitats they support. A pre-construction survey would be undertaken to map the profile of the existing bed, banks and channel gradient to inform the reinstatement works. The survey would also identify the location of any in-channel features such as riffles and pools although it is noted that for the majority of watercourses crossed by open cut techniques morphological diversity is likely to be low.	Construction	Main Works Contractor
HYD8	Once the pipelines are installed, the bank, channel profile and gradient would be reinstated to existing or enhanced conditions. The riverbed material would be replaced within the channel and opportunities to encourage flow regime diversity would be	Construction	Main Works Contractor

Ref	Measure	Project Phase	Responsible Party
	considered. Further detail on ecological mitigation and enhancement is included in Chapter 7: Ecology and Biodiversity. A geomorphologist would review the method statement for the open cut watercourse crossings, which would be included in the CEMP, and would also confirm that the channels have been suitably reinstated.		Applicant
HYD9	Where practicable, canals crossed by the proposed pipeline would be crossed using trenchless techniques.	Construction	Main Works Contractor
HYD10	The location and condition of existing land drainage infrastructure would be established during pre-construction surveys, and a record would be compiled. Where necessary, and subject to agreement with the landowner / occupier, new field drains would be installed to: • Enable the landowner / occupier's current drainage system to continue working throughout the period of pipeline construction. • Help prevent damage to the soil structure. • Aid recovery from construction activity. • Ensure the site work areas are kept as dry as practically possible. A specialist drainage contractor in most instances would carry out the work. Permanent records of the land drainage locations would be produced.	Construction	Applicant, Main Works Contractor and the landowners / occupiers
HYD11	Riverbank and in-channel vegetation will be retained where not directly affected by installation works. Natural substrate will be provided through box culverts at temporary watercourse crossings.	Construction	Main Works Contractor
HYD12	Surface water drainage features, based on Sustainable Drainage (SuDS) techniques, will be installed at the AGI and Pumping Station sites during construction. Access roads and haul roads will also have suitable drainage provisions. Drainage features would provide attenuation and treatment of runoff.	Construction	Applicant and Main Works Contractor
HYD13	Fuels, oils and chemicals will be stored responsibly, away from sensitive water receptors. Where practicable, they will be stored >15m from watercourses, ponds, and groundwater-dependent terrestrial ecosystems. Where it is not practicable to maintain a >15m distance, additional measures will be identified. All refuelling, oiling, and greasing of construction plant and equipment will take place above drip trays and away from drains as far as is reasonably practicable. Vehicles and plant will not be left unattended during refuelling.	Construction	Main Works Contractor
HYD14	Wash down of vehicles and equipment will take place in designated areas within construction compounds. Wash water will be prevented from passing untreated into watercourses and groundwater. Appropriate measures will include use of sediment traps.	Construction	Main Works Contractor
HYD15	Run-off across the site will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. There will be no intentional discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority (except in the case of an emergency).	Construction	Main Works Contractor
HYD16	Where AGIs are located in floodplains, the footprint of the AGIs would be very small compared to the expansive nature of the floodplains they would be located within. Flood risk impacts on vulnerable components such as AGIs would be mitigated using a flood resilient design.	Operation	Applicant
HYD17	Surface water drainage from permanent above ground infrastructure would be managed using SuDS in accordance with policy and guidance requirements of the relevant Lead Local Flood Authorities. The drainage systems will be designed to accommodate runoff from the 1 in 100-year storm, inclusive of the recommended 40% allowance for climate change.	Operation	Applicant
HYD18	Construction, operations, decommissioning and design of the pipeline will be in accordance with best practice guidance.	Construction	Main Works Contractor

Ref	Measure	Project Phase	Responsible Party
		Operation Decommissioning	
HYD19	Construction Environment Management Plan (CEMP) will be prepared prior to construction of the Project	Construction	Applicant
HYD20	Decommissioning Environmental Management Plan (DEMP) will be implemented during the decommissioning phase	Decommissioning	Applicant

18.7 Preliminary Assessment of Potential Impacts

Construction

- 18.7.1 The potential impacts for Hydrology and Land Drainage associated with the construction phase are provided in Table 18-10.
- 18.7.2 Intertidal impacts are in relation to the potential for contaminant release and resuspension associated with sediment disturbance.

Table 18-10 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
All watercourses with open cut crossings or culverts for access: hydromorphology	Low / Medium	Temporary physical disturbance and temporary changes to watercourse flow regimes.	Moderate	Temporary	Adverse	Direct
Coastal waters: water quality	Very High / High	Temporary effects at watercourse crossings and construction works sites, for example, due to the generation of silted runoff and associated with over-pumping and dewatering activities. There is also limited potential for break out of drilling muds at trenchless crossings.	Minor	Temporary	Adverse	Indirect
Main rivers: water quality						
Ordinary watercourses: water quality						
Ponds: water quality						
Main rivers: flood flow storage and conveyance	Very High / High	Fluvial and tidal flood risk impacts to project construction work sites.	Moderate	Temporary	Adverse	Direct

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Ordinary watercourses with mapped areas of Flood Zone 2/3: flood flow storage and conveyance						
Land drainage regime: flood flow storage and conveyance	Medium	The existing land drainage regime could be impacted through construction works, damage to soil structure and construction of AGIs on greenfield land.	Moderate	Temporary	Adverse	Direct
People and existing development within the floodplain: flood risk	High	Temporary increase in flood risk due to loss of floodplain storage or disruption of flood flows.	Minor	Temporary	Adverse	Direct
Existing or proposed flood risk management infrastructure	High	Impacts on structural integrity of flood defences, both fluvial and tidal. Conflicts with planned flood risk management projects and capital works.	Minor	Temporary		Indirect
Local scour due to presence of vessels and jack-up barge	Low	Localised seabed erosion and sediment resuspension near temporary structures potentially	Negligible	Short-term	Adverse	Indirect

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
		leading to the resuspension of contaminants.				
Effects of pipelay and landfall drilling activities on water quality	Low	Localised increase in turbidity and potential for minor contaminant release.	Negligible	Short-term	Adverse	Direct

Operation

- 18.7.3 The potential impacts for Hydrology and Land Drainage associated with the operational phase are provided in Table 18-11.
- 18.7.4 No operational impacts to intertidal water quality are expected. It has been assumed for the purposes of the PEIR that the pipeline will be buried to a sufficient depth such that impacts related to pipeline exposure are not expected. In addition, thermal impacts associated with the physical presence of the pipeline are not expected to have any hinderance on local water quality.

Table 18-11 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Main rivers: flood flow storage and conveyance	Very High	Fluvial and tidal flood risk impacts on AGIs in Flood Zone 3.	Minor	Long-term	Adverse	Direct
People and existing development within the floodplain: flood risk	High	Increase in flood risk due to loss of floodplain storage or disruption of flood flows where AGI are constructed in Flood Zone 3.	Minor	Long-term	Adverse	Indirect
Land drainage regime: flood flow, storage and conveyance	Medium	Permanent increases in impermeable area due to the AGIs could result in increased surface water runoff, increased surface water flood risk and changes to the existing land drainage regime.	Minor	Long-term	Adverse	Direct

Decommissioning

- 18.7.5 The potential impacts for Hydrology and Land Drainage associated with the decommissioning phase are provided in Table 18-12.
- 18.7.6 No decommissioning water quality impacts are expected in the intertidal zone given the pipeline is assumed to be remaining in-situ.

Table 18-12 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
People and existing development within the floodplain: flood risk	Medium to Very High (depending on type of development)	Increased flood risk due to decommissioning of AGIs in the floodplains	Minor	Temporary	Adverse	Direct

18.8 Additional Mitigation and Enhancement Measures

18.8.1 This section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 18.7.

18.8.2 It follows the embedded mitigation measures set out in Section 18.6 and accordingly is limited to the information known at this stage of the design. Full details will be provided within the ES.

Construction

18.8.3 Any works with the potential to affect the floodplain or flow regime of a main river would be subject to consent under the Environmental Permitting (England and Wales) Regulations 2017. Similarly, works with potential to impede land drainage or the flow regime of any ordinary watercourse would be subject to consent under the Land Drainage Act 1991. Alternatively, powers to undertake such works will be included within the DCO, following agreement of protective provisions with the Environment Agency and other land drainage authorities.

18.8.4 An environmental measure will be shaped within the ES with regard to floodplain compensation storage requirements.

18.8.5 As detailed in Chapter 7: Ecology and Biodiversity, enhancement of unaffected water vole habitats near construction activities and strategic habitat creation to support local water vole populations is proposed.

18.8.6 Prior to the commencement of works, agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal, to assess whether the beach has been returned to the pre-installation state.

18.8.7 A Beach Monitoring and Management Plan may also be agreed with the Local Authority and relevant consultees, as required. This Plan would detail the reinstatement of the beach to pre-construction condition, as far as reasonably practicable.

18.8.8 The FRA which will accompany the ES will outline the proposed mitigation measures / commitments to ensure no detrimental effects on flood risk from rivers and the sea or the functioning of flood defences. This would likely include measures such as the provision of compensatory storage for any losses of floodplain storage and flood defence monitoring to enable detection of any

effects on the structural integrity / condition of flood defence assets during construction of the Project.

Operation

- 18.8.9 Over the course of the lifetime of the Project there may be monitoring of the pipeline at the Easington Landfall to ensure it does not become exposed as a result of erosion, with contaminant leaching into the marine environment and impeding local water quality. However, it is important to note, the design of the pipeline through the coastal zone is such to ensure sufficient burial depth.

Decommissioning

- 18.8.10 The same mitigation measures are assumed for the decommissioning phase as implemented for the construction phase.
- 18.8.11 As the pipeline will remain in-situ post operation, no impacts are foreseen at the Easington Landfall in relation to intertidal water quality, such that no additional mitigation measures are required.

18.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 18.9.1 Table 18-13 below summarises the preliminary assessment of potential significant effects associated with the Project.

Table 18-13 – Summary of the Preliminary Assessment of Potential Significant Effects

Resource / Receptor	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Coastal waters: water quality	Very high / high	Construction	Temporary effects at watercourse crossings and construction works sites, for example, due to the generation of silted runoff and associated with over-pumping and dewatering activities. There is also limited potential for break out of drilling muds at trenchless crossings.	Temporary	HYD17	Moderate
Main rivers: water quality						
Ordinary watercourses: water quality	High / medium					
Main rivers: flood flow storage and conveyance	Very high / high	Construction	Fluvial flood risk impacts to project construction work sites.	Temporary	HYD6 HYD7 HYD8 HYD14	Moderate
Ordinary watercourses with mapped areas of Flood Zone 2/3: flood flow storage and conveyance						

Resource / Receptor	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Land drainage regime: flood flow storage and conveyance	Medium	Construction	The existing land drainage regime could be impacted through construction works, damage to soil structure and construction of AGIs on greenfield land.	Temporary	HYD6 HYD7 HYD8 HYD14	Moderate
Main rivers: flood flow storage and conveyance	Very high	Operation	Fluvial flood risk impacts on AGIs in Flood Zone 3.	Permanent	HYD1 HYD3 HYD6 HYD7 HYD8 HYD14	Moderate
People and existing development within the floodplain: flood risk	Medium to Very High (depending on type of development)	Decommissioning	Flood risk impacts	Temporary	HYD19	Moderate
Local scour due to presence of	Low	Construction	Localised seabed erosion and sediment	Short-term	Agreement on the requirements in the	Minor

Resource / Receptor	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
vessels and jack-up barge			resuspension near temporary structures leading to the resuspension of contaminants.		nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal. A Beach Monitoring and Management Plan.	
Effects of installation activities on water quality	Low	Construction	Localised increase in turbidity and potential for minor contaminant release	Short-term	Agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal. A Beach Monitoring and Management Plan.	Minor

18.10 Next Steps

Design development

- 18.10.1 The assessment undertaken in the ES would take into account any design changes (e.g., as a result of stakeholder engagement or development of the design) since completion of the PEIR.
- 18.10.2 No design developments are proposed to be undertaken in the context of water quality impacts in the intertidal environment. The design of the Project, alongside both the embedded and additional mitigation presented within this chapter are deemed sufficient to minimise any significant impacts to the water quality receptors.

Engagement

- 18.10.3 Due to the iterative design process, stakeholder engagement will continue after the statutory consultation period. Further engagement will be undertaken with the IDBs, and discussions will continue with the Environment Agency and LLFAs regarding watercourse crossings and surface water drainage principles.
- 18.10.4 Targeted consultations will be held with the Environment Agency focussed on flood risk. It is planned that these discussions will facilitate agreement on the flood data to be used in the FRA. Any specific requirements arising from these consultations regarding the assessment to be undertaken would be addressed in the FRA which would inform the ES.
- 18.10.5 Engagement with the relevant consultees (i.e., the MMO, Natural England and the Environment Agency) will continue in relation to intertidal water quality. Any additional consultation undertaken will be included in the ES.

Surveys

- 18.10.6 Intertidal Phase 1 walkover survey and Phase 2 site survey were undertaken at Easington Landfall in April 2025. Preliminary results of this are presented within Chapter 20: Coastal Processes, and where relevant Chapter 7: Ecology and Biodiversity and Chapter 10: Ground Conditions and Hydrogeology. Finalised contaminant and infaunal analysis will be presented in the ES.
- 18.10.7 A walkover survey is proposed between now and the ES submission, focusing on the terrestrial AGI sites and water features. Site observations would inform the full assessment undertaken for the ES.

18.10.8 Post-submission, the following surveys would be undertaken prior to commencement of construction works:

- Flood defence pre-construction surveys; and
- Land drainage surveys.

Further Assessment

18.10.9 The next steps are developing the FRA and WFD screening assessment. The findings of these would inform the full assessment undertaken for the ES.

18.10.10 No further assessments are proposed for intertidal water quality aside from what is to be presented within the WFD.

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19 Major Accidents and Disasters

19.1 Introduction

- 19.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Major Accidents and Disasters (MA&D). The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 19.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary MA&D effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project.
- 19.1.3 This chapter has considered potential unplanned events or situations that have been determined as relevant to the Project, with a potential to result in significant environmental effects. Environmental effects associated with unplanned events that do not meet the definition of a major accident and / or disaster (e.g. minor leaks and spills that may be contained within the construction sites) are addressed in other topic chapters as appropriate and not in this section. This chapter should be read in conjunction with:
- Chapter 7: Ecology and Biodiversity due to the interactions on intertidal areas during construction and operation.
 - Chapter 10: Ground Conditions and Hydrogeology due to potential interactions with ground conditions and hydrogeology.
 - Chapter 11: Cultural Heritage due to potential interactions with heritage assets.
 - Chapter 14: Socio-economics, Tourism and Recreation for impacts on socio-economic, recreational and tourism receptors.
 - Chapter 15: Human Health and Wellbeing due to the interactions with human health.
 - Chapter 18: Hydrology and Land Drainage due to the interactions on dam breaches and flood risk.
 - Chapter 20: Coastal Processes due to the interactions on intertidal areas during construction and operation.
- 19.1.4 This chapter is supported by the following appendices:
- Volume 4 - Appendix 19.1: Scoping Assessment of MA&D.

19.2 Legislation, Policy and Guidance

Legislation

19.2.1 Legislation relevant to MA&D is detailed in Table 19-1.

Table 19-1 – Summary of Legislation relevant to MA&D

Legislation	How it is considered within this PEIR
Health and Safety at Work Etc. Act 1974 (HSWA) (Ref 19.1)	This act sets out the legal requirements and regulatory framework within which the Project must be designed, constructed and operated. It provides a legal framework for the provision of safe plant and equipment and prevention of harm to people from occupation hazards present in a workplace, including emergencies which may affect those off site or visiting a site. The act has informed the methodology of the MA&D assessment.
Control of Major Accident Hazards (COMAH) Regulations 2015 (Ref 19.2)	These regulations aim to reduce the risk of accidents involving dangerous substances, such as toxic substances, flammable substances, and explosives. The regulations also protect the environment and people from the potential damage caused by these accidents. The regulations have informed the methodology of the MA&D assessment.
Pipelines Safety Regulations (PSR) 1996 (Ref 19.3)	These regulations are a set of regulations established in the United Kingdom to ensure the safe operation and maintenance of pipelines, focusing on preventing accidents, leaks, and other potential hazards associated with pipelines. The regulations have informed the methodology of the MA&D assessment.
Pressure Systems Safety Regulations (PSSR) 2000 (Ref 19.4)	These regulations are a set of regulations that aim to prevent serious injury from pressure systems failing or their components failing. The regulations apply to pressure systems used at work and include a series of requirements to ensure safety. The regulations have informed the methodology of the MA&D assessment.
Construction (Design and Management) Regulations 2015 (CDM Regulations) (Ref 19.5).	The CDM regulations were developed to help prevent construction accidents and fatalities. They ensure that construction work is carefully planned so that risks are managed from start to finish. The regulations have informed the methodology of the MA&D assessment.

Policy

National Planning Policy

19.2.2 National Planning Policy relevant to MA&D is detailed in Table 19-2.

Table 19-2 – Summary of National Planning Policy relevant to MA&D

Planning Policy Reference	Policy Context	How it is considered within this PEIR
National Policy Statement		
EN-1 (Ref 19.6)	4.9.16 COMAH regulations apply throughout the life cycle of the facility, i.e. from the design and build stage through to decommissioning. They are enforced by the Competent Authority comprising HSE or ONR (Office for Nuclear Regulation, for nuclear) and the EA acting jointly in England	The MA&D assessment will consider the consultation received through stakeholder engagement from the competent authorities to ensure the Project is compliant.
EN-1 (Ref 19.6)	4.13.5 Applicants should consult with the HSE on matters relating to safety	Engagement with the HSE is being undertaken throughout the EIA process.
EN-4 (Ref 19.7)	2.21.9 – 2.21.13 The principal legislation governing the safety of pipelines (the Pipelines Safety Regulations 1996) requires that pipelines are designed, constructed and operated so that the risks are as low as is reasonably practicable (ALARP). In determining compliance, HSE expects pipeline operators to apply relevant good practice as a minimum.	The pipeline and any proposed mitigation will be designed to ensure any risks are ALARP, with design of the pipeline to apply relevant good practice.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
	In the pipeline industry there are well established standards, covering design, operation and maintenance of major accident hazard pipelines which can be used to demonstrate risks are ALARP.	

Guidance

- 19.2.3 The MA&D assessment has been carried out in accordance with the following guidance:
- The Institute of Environmental Management and Assessment (IEMA) (2020) has developed a guidance document 'Major Accidents and Disasters in EIA: A Primer' (Ref 19.8) to increase awareness of MA&Ds within EIA and its application.
 - The Health and Safety Executive's (HSE) Reducing Risks, Protecting People (R2P2) (Ref 19.9).
 - The Chemical and Downstream Oil Industries Forum (CDOIF) (Ref 19.10).
 - HSE RR1035 Update of pipeline failure rates for land use planning assessments (Ref 19.11).
 - UK Onshore Pipeline Operator's Association (UKOPA) Pipeline Product Loss Incidents and Faults Report (1962 – 2019) (Ref 19.12).
 - HSE Failure Rate and Event Data for use within Risk Assessments (Ref 19.13).

19.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 19.3.1 A summary of relevant parts the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined in Table 19-3 below.

Table 19-3 – Summary of Scoping Opinion relevant to MA&D

Section Reference	Matter	Comments	Response
ID 3.14.1	To be scoped out: Accidents including dropped objects, heavy plant, temporary works, rock falls from tunnel boring and problems with machinery – construction phase.	The Inspectorate agrees that significant effects are unlikely and that this matter can be scoped out of the Environmental Statement (ES).	Noted. No further action required.
ID 3.14.2	To be scoped out: Impact of construction phase activities on unexploded ordnance (UXO).	The Inspectorate is content to scope out further assessment for areas of low risk.	Noted. No further action required.
ID 3.14.3	To be scoped out: Construction traffic Accidents.	The Inspectorate is content with this approach but advises the applicant to provide clear cross-referencing in the Major Accidents and Disasters ES aspect chapter to where the assessment is located.	The assessment of Construction traffic accidents is included in Chapter 16 – Traffic and Transport PEIR and ES chapters.
ID 3.14.4	To be scoped out: Impacts on aviation - construction and operational phases.	The Scoping Report states that Humberside Airport is approximately 800m south of the proposed development. However, the Inspectorate notes that a temporary construction compound is proposed within Humberside Airport (Volume 2 – Figure 3.1 Page 9 of 15) and e-page 17 of Appendix D states that the construction workforce population would at its closest point be located 250m from any airport. The Scoping Report states that it is not currently known if cranes exceeding 10m in height would be required within 6km of the airport. The Inspectorate welcomes that the airport would be consulted if this were to be the case. However, the Inspectorate is unclear of the intended difference between ‘Aviation’ and ‘Aircraft’ within Appendix D and therefore what potential effects the applicant is referring to under this matter which is not addressed under ‘Aircraft’. The Inspectorate has commented on Aircraft at ID 3.14.12.	Volume 4 - Appendix 19.1: Scoping Assessment of MA&D has been updated since the Scoping Report to amend the distances to Humberside Airport and the location of the temporary construction compound within the Airport boundary. In addition, the aircraft and aviation sections have been combined for clarity with both scoped out, as stated in the Scoping Report and agreed.
ID 3.14.5	To be scoped out: Impacts on mines and storage caverns - construction and operational phases.	The Scoping Report proposes to scope out an assessment of impacts on mines and storage from the Major Accidents and Disasters ES Chapter. A full assessment of the impact on mines and storage caverns	The assessment of mines and storage caverns is included in Chapter 10 – Geology and Hydrology PEIR and ES chapters.

Section Reference	Matter	Comments	Response
		would instead be presented in the Geology and Hydrology ES Chapter. The Inspectorate is content with this approach but advises the applicant to provide clear cross-referencing in the Major Accidents and Disasters ES aspect chapter to where the assessment is located.	
ID 3.14.6	To be scoped out: Impacts on transport networks and network impacts on the pipeline - construction and operational phases.	The Inspectorate agrees that this matter can be scoped out.	Noted. No further action required.
ID 3.14.7	To be scoped out: Impacts on watercourses - construction and operational phases.	Appendix D of the Scoping Report anticipates that major rivers and canals would be crossed using trenchless techniques. The Inspectorate agrees that construction phase impacts from trenchless crossings are not likely to result in significant effects in terms of major accidents and disasters and agrees that this matter can be scoped out. For any smaller watercourses to be crossed with open cut techniques, the Scoping Report states this would be subject to agreement with the Environment Agency or Internal Drainage Board. The Inspectorate agrees that significant effects are not likely and further assessment is not required, however considers that relevant control measures should be identified within the ES. The Inspectorate agrees that as the pipeline would be a buried feature, operational phase impacts are not likely to result in significant effects in terms of major accidents and disasters and agrees that this matter can be scoped out.	Relevant control measures for when smaller watercourses are to be crossed with open cut techniques will be set out in Chapter 18 – Hydrology and Land Drainage PEIR and ES chapters.
ID 3.14.8	To be scoped out: Impacts on intertidal areas - construction and operational phases	The proposed pipelines would need to cross two intertidal areas, the River Humber and the Holderness Coast. On the basis that the River Humber is crossed utilising trenchless techniques, the Inspectorate is content that construction phase impacts on the River Humber intertidal area are not likely to result in significant effects in terms of major accidents and disasters and agrees that this matter can be scoped out. The Inspectorate is content with the approach to present the assessment of impacts to the Holderness Coast intertidal area in the Ecology and Biodiversity and Water Resources, Flood Risk and Land Drainage ES Chapters, but	The assessment of impacts to the Holderness Coast intertidal area is included in Chapter 7 – Ecology and Biodiversity and Chapter 18 – Hydrology and Land Drainage PEIR and ES chapters and will be referenced within the MA&D PEIR and ES chapters as appropriate.

Section Reference	Matter	Comments	Response
		advises the applicant to provide clear cross-referencing in the Major Accidents and Disasters ES aspect chapter to where the assessment is located. Regarding operation, as the pipeline would be a sealed and buried feature, the Inspectorate considers that impacts on intertidal areas are not likely to result in significant effects in terms of major accidents and disasters and agrees that this matter can be scoped out.	
ID 3.14.9	To be scoped out: Leaks and spills - construction and operational phases.	The Inspectorate notes that these matters will be considered elsewhere in the ES and is satisfied that they can be scoped out of the Major Accidents and Disasters ES Chapter.	Noted. No further action required.
ID 3.14.10	To be scoped out: Accidents during maintenance – operational phase.	The Inspectorate is content that accidents during maintenance are not likely to lead to significant effects on the environment and agrees this matter can be scoped out of the ES.	Noted. No further action required.
ID 3.14.11	To be scoped out: Structural collapse of assets – operational phase.	The Inspectorate is content that significant effects are not likely and that this matter can be scoped out of the ES.	Noted. No further action required.
ID 3.14.12	To be scoped out: Aircraft - construction and operational phases.	The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.	Noted. No further action required.
ID 3.14.13	To be scoped out: Rail - construction and operational phases.	The Inspectorate agrees that construction phase impacts are not likely to result in significant effects in terms of major accidents and disasters and agrees that this matter can be scoped out.	Noted. No further action required.
ID 3.14.14	To be scoped out: External nuclear major accidents - construction and operational phases	Having considered the nature and characteristics of the proposed development and the distance from nuclear sites, the Inspectorate is content that risks to the proposed development from accidents at nuclear sites can be scoped out.	Noted. No further action required.
ID 3.14.15	To be scoped out: • Loss of utilities • Terrorism • Widespread public disorder • Biological threats • Lightning • Seismic • Space weather.	Based on the reasoning and evidence presented in the Scoping Report, the Inspectorate is content that risks to or from the proposed development from these matters are not likely to result in significant effects. These matters can be scoped out of the assessment.	Noted. No further action required.

Section Reference	Matter	Comments	Response
ID 3.14.16	To be scoped out: Extreme weather conditions.	The Scoping Report seeks to scope out impacts from extreme weather conditions as a separate matter from the Major Accidents and Disasters ES Chapter. The assessments would instead be presented in the Climate Change, Adaptation and Resilience ES Chapter. The Inspectorate is content with this approach but advises the applicant to provide clear cross-referencing in the Major Accidents and Disasters ES aspect chapter to where the assessments are located.	The assessment of impacts from extreme weather is included in Chapter 8 – Climate PEIR and ES chapters and will be referenced within the MA&D PEIR and ES chapters as appropriate.
ID 3.14.17	To be scoped out: • Dam / reservoir breaches • Flood risk • Coastal erosion and • Landslides.	The Scoping Report seeks to scope out impacts from dam / reservoir breaches, flood risk and coastal erosion and landslides from the Major Accidents and Disasters ES Chapter. The assessments would instead be presented in the Hydrology and Land Drainage assessments (the Inspectorate assumes this to mean the Water Resources, Flood Risk and Land Drainage ES chapter) and the Coastal and Intertidal Impacts assessment. The Inspectorate is content with this approach but advises the applicant to provide clear cross-referencing in the Major Accidents and Disasters ES aspect chapter to where the assessments are located.	The assessment of impacts from dam / reservoir breaches, flood risk and coastal erosion and landslides is included in Chapter 18 – Hydrology and Land Drainage and Chapter 20 - Coastal Processes PEIR and ES chapters and will be referenced within the MA&D PEIR and ES chapters as appropriate.

Summary of Engagement

- 19.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 19-4 below.

Table 19-4 – Summary of Stakeholder Engagement relevant to MA&D

Consultee	Date and method of engagement	Summary of Issues Raised	Response
Environment Agency	31/1/25, response to scoping opinion	Appendix D (Scoping Assessment of Major Accidents and Disasters) should include reference to unintentional breaching of the chalk aquifer, resulting in uncontrolled artesian groundwater flow which could lead to flooding and water resource losses. This could be recognised in the discussion of Flood Risk but has been excluded.	Flood risk and water resource loss from uncontrolled artesian groundwater will be covered in Chapter 10 – Geology and Hydrogeology.
Health and Safety Executive	24/1/25, response to scoping opinion	The project crosses the Consultation Zones of several Major Accident Hazard (MAH) sites and MAH pipelines. Please see the list attached in Appendix 1 a (MAH sites) & b (MAH pipelines). The Applicant should make contact with the operators of MAH sites (see Appendix 1 a), to inform an assessment of whether or not the proposed development is vulnerable to a possible major accident. The Applicant should also make the necessary approaches to the relevant MAH pipeline operators (see Appendix 1 b). There are three particular reasons for this: i. the pipeline operator may have a legal interest in developments in the vicinity of the pipeline. This may restrict developments within a certain proximity of the pipeline.	Consultation is ongoing with the outcome to be reported in the Environmental Statement.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		ii. the standards to which the pipeline is designed and operated may restrict major traffic routes within a certain proximity of the pipeline. Consequently, there may be a need for the operator to modify the pipeline or its operation if the development proceeds. iii. to establish the necessary measures required to alter / upgrade the pipeline to appropriate standards.	
North East Lincolnshire Council	31/1/25, response to scoping opinion	Further discussions and confirmation as to whether the pipeline would be deemed to be a hazardous pipeline under HSE designation. If so, further details on the impact of this and HSE zones should be provided. In addition, public safety considerations should also be considered and provided.	HSE have been consulted as detailed above in this table. The public safety considerations have been considered in the course of the production of this MA&D chapter.
Northern Gas Networks	3/1/25, response to scoping opinion	NGN has a number of gas assets in the vicinity of some of the identified “site development” locations. It is a possibility that some of these sites could be recorded as Major Accident Hazard Pipelines (MAHP), whilst other sites could contain High Pressure gas and as such there are Industry recognised restrictions associated to these installations which would effectively preclude close and certain types of development. The regulations now	Consultation is ongoing with the outcome to be reported in the Environmental Statement.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		include “Population Density Restrictions” or limits within certain distances of some of our “HP” assets. The gas assets mentioned above form part of the Northern Gas Networks “bulk supply” High Pressure Gas Transmission” system and are registered with the HSE as Major Accident Hazard Pipelines. Any damage or disruption to these assets is likely to give rise to grave safety, environmental and security of supply issues. NGN would expect you or anyone involved with the site (or any future developer) to take these restrictions into account and apply them as necessary in consultation with ourselves. We would be happy to discuss specific sites further or provide more details at your locations as necessary. If you give specific site locations, we would be happy to provide gas maps of the area which include the locations of our assets. (In terms of High-Pressure gas pipelines, the routes of our MAHP’s have already been lodged with members of the local Council’s Planning Department)	
Biofuelwatch	2024 response to non-statutory consultation	Biofuelwatch submitted concerns around safety during the non-statutory consultation period, noting the HSE guidelines and	HSE have been consulted as detailed above in this table.

Consultee	Date and method of engagement	Summary of Issues Raised	Response
		requested that the HSE confirm the safety of the pipeline. Engagement with HSE is ongoing.	

19.4 Assessment Methodology

Baseline Data

Study Area

- 19.4.1 Different Study Areas have been applied depending on the nature of the factor (defined below) that is under consideration. Each factor has been grouped into either an external source of major accidents or disasters (where the Project is the receptor), or where the Project is a source of major accident to receptors. The following factors and associated distances were adopted for setting the Study Area in order to capture internal and external influencing factors which may have significant effects:
- External major accident Study Areas with the potential to create risks to the Project:
 - COMAH Establishments within 3 km (based upon typical HSE Land Use Planning restrictions).
 - Major Accident Hazard Pipelines within 1 km (Ref 19.15).
 - Carbon capture projects within the Humber region.
 - Fuel storage or retail facilities (where not COMAH establishments) – 1km (based on professional judgement).
 - Other utilities (pipelines, electrical, gas, electrical, telecommunications etc.) crossing the draft Order Limits.
 - Disaster Study Areas:
 - Natural features with the potential to create risks to the Project (for example, hydrological and geological - more specifically, flood risk and unstable ground conditions respectively) within 1 km (beyond this Study Area there would be no pathway to affect the Project).
 - Receptor Study Areas:
 - Receptors during construction within 500 m (beyond this Study Area there would be no pathway from construction activities to affect receptors).
 - Receptors during operation (including commissioning) within 1 km (based upon a worst-case estimate of potential effects of carbon dioxide releases).
 - Receptors during decommissioning within 500 m (beyond this Study Area there would be no pathway from decommissioning activities to affect receptors).

- 19.4.2 The temporal scope of the assessment will be consistent with the period over which the Project would be carried out and therefore will cover the construction, operation and decommissioning phases. The anticipated timings of these phases are described in Chapter 2: Project Description.

Baseline Data Collection

Desk Study Sources

- 19.4.3 Baseline conditions of the Project were established during a desk study using the following sources:
- National Risk Register of Civil Emergencies (Ref 19.16).
 - British Geological Survey 'Onshore GeoIndex' (Ref 19.17).
 - Tsunamis Hazard Map (Ref 19.18).
 - The International Disaster Database (Ref 19.19).
 - HSE COMAH 2015 Public Information Search (Ref 19.20).
 - The Coal Authority Interactive Map (Ref 19.21).
 - Project specific aerial imagery and mapping covering the Study Area.
 - Information from the review of planning applications within the Study Area.
- 19.4.4 The following chapters have also been utilised to aid in the collection of baseline data for the Project as follows:
- Chapter 7: Ecology and Biodiversity.
 - Chapter 10: Ground Conditions and Hydrogeology.
 - Chapter 11: Cultural Heritage.
 - Chapter 14: Socio-economics, Tourism and Recreation.
 - Chapter 15: Human Health and Wellbeing.
 - Chapter 16: Traffic and Transport.
 - Chapter 18: Hydrology and Land Drainage.
 - Chapter 20: Coastal Processes.

Site Visits and Surveys

- 19.4.5 No surveys for MA&D are required for the PEIR. The MA&D assessment will draw on the results of the surveys undertaken for each of the technical chapters detailed above.

Impact Assessment Methodology

- 19.4.6 A significant effect for MA&D focuses on risk. This differs from the way in which many other topics in the EIA context are addressed, which assigns a sensitivity to receptors. Typically, other topics examine effects that are considered likely to

occur and therefore such effects are unlikely to meet the thresholds required to be considered a major accident or a disaster.

- 19.4.7 Risk tolerability for MA&Ds in the UK is built on the principle of eliminating intolerable risks, and to ensure, particularly at engineering design stages, that any residual risks are further minimised where 'reasonably practicable'. This principle has been applied in the assessment here, with 'intolerable risk' interpreted as equivalent to 'significant adverse effects'. The term 'reasonably practicable' means that the level of risk and the benefits of reducing risk must be assessed against the trouble, time and money needed to control it (also termed As Low As Reasonably Practicable (i.e. ALARP)).
- 19.4.8 Intolerable, or significantly adverse effects, are based upon commonly accepted benchmarks:
- Serious damage to human populations – This includes harm which would be considered substantial, i.e., any fatality, multiple serious injuries or a substantial number requiring medical attention.
 - Serious damage to the environment – Loss or significant detriment to populations of species or organisms, designated sites, cultural heritage sites, contamination of drinking water supplies, surface or groundwater, or harm to environmental receptors in line with other UK major accident regulations.
- 19.4.9 For the MA&D event types which have been scoped in for further assessment in the PEIR, the assessment has been conducted using a staged approach as outlined here:
- Identifying potential risk events related to the scoped in major event types (source / pathways and receptors).
 - Screening these risk events, e.g. to remove unrealistic worst-case scenarios.
 - Defining the reasonable worst consequence if the event did occur.
 - Identifying any cross-disciplinary impacts.
 - Identifying any possible prevention, minimisation and / or mitigation measures.
 - Assessing the likelihood.
 - Determining whether the risk has been mitigated to As Low As Reasonably Practicable (ALARP) and identification of any residual risks and their significance.
- 19.4.10 The following are the events that have been scoped into the MA&D assessment. These are typically by their nature of a low likelihood but are

important considerations so that resilience against them can be built into a project at the planning stage and provide sufficient information for informed decisions to be made for planning purposes. Resilience is built by ensuring that high consequence events are eliminated or, where elimination is not possible, reduced to such an extent that the chance of them occurring is so small that they can be deemed not to be significant.

- 19.4.11 Volume 4 - Appendix 19.1 considers the identified potential hazard events and their likelihood and identifies whether an event is scoped into or out of the assessment, based on the guiding principles outlined above, having screened these events to remove unrealistic worst-cases.
- 19.4.12 The following factors are important in defining the criteria:
- Likelihood of the event occurring.
 - Magnitude of change – the consequence thresholds of MA&Ds are established from the following dimensions and intrinsically account for receptor sensitivity:
 - Severity of harm (a combination of extent and damage potential).
 - Duration of harm (the recovery period) for non-human receptors, or the numbers of people affected for human receptors.
- 19.4.13 These combine to provide a measure of risk (i.e., the combination of the serious damage arising from a potential event and its likelihood of occurrence). At this stage, the estimates are necessarily qualitative and based on professional judgement informed by comparison against experience in similar industries and for similar developments, where possible and practical.

Likelihood

- 19.4.14 The assessment applies professional judgement to evaluate the likelihood of each potential major accident or disaster occurring once the mitigation is applied. The likelihood and risk reported is that above the baseline (i.e., the incremental likelihood and risk). This is the risk that can be attributed to the development directly or indirectly.
- 19.4.15 While qualitatively stated, the definition and classifications used for likelihood are designed to be compliant with HSE's R2P2 (Ref 19.9) for societal risk, and CDOIF (Ref 19.10) for environmental tolerability, when considered on a per effect basis. Professional judgement has been used to establish the appropriate qualitative parameters for likelihood categorisation, with levels used ranging from 'Remote chance of occurring' through to 'Reasonable chance of occurring'. These then provide an allocation of likelihood against magnitude to determine

risk significance, which in turn is an approach that is consistent with major accident tolerability perceptions commonly applied elsewhere in the UK.

- 19.4.16 The qualitative definitions of the terms used for likelihood are given in Table 19-5.

Table 19-5 – Likelihood Definitions

Term	Remote chance of occurring	Very small chance of occurring	Small chance of occurring	Chance of occurring	Reasonable chance of occurring
Definition:	Unlikely to ever occur but cannot be completely ruled out	Very unlikely to occur	Unlikely to occur during the construction, operational or decommissioning phase	Potential to occur once during the construction, operational or decommissioning phase	Potential to occur several times during the construction, operational or decommissioning phase

Magnitude of Effect

- 19.4.17 In order to distinguish between potential major accidents of differing severities, all potential MA&Ds are categorised into one of four magnitude of change categories: Low, Medium, High and Very High. Any scenario which does not meet the criteria of a MA&D is simply listed as 'Not MA&D'. Magnitude of change within the context of MA&Ds is assessed from both the severity of the harm, and either the duration over which the receptor experiences that harm (for non-human receptors) or the number of people affected (human receptors).
- 19.4.18 Four categories of harm severity are considered:
- Not Significant: This level of harm is below the minimum threshold determined for a major accident or disaster in the CDOIF guidance (Ref 19.10) and / or in R2P2 (Ref 19.9).
 - Severe, Major or Catastrophic: These represent increasing levels of damage or harm to populations or environmental receptors.

Human Receptors

- 19.4.19 For human receptors, the number of people affected is accounted for in assigning the magnitude of change. The combination of harm severity and people affected for human receptors to determine magnitude of change is given in Table 19-6. This approach is based on professional judgement and ensures that there is appropriate alignment to HSE R2P2 guidelines by factoring in the number of people affected.

Table 19-6 – Category of Risk for MA&D for Human Receptors

Severity of Harm	Category of Risk	Number of people affected
Catastrophic	Very High	Very High
	High	Low to High
Major	Medium	
Severe	Low	
Not Significant	Not MA&D	

Non-Human Receptors

- 19.4.20 For non-human receptor types, four categories of duration are considered: Short, Medium, Long and Very Long Term.

- 19.4.21 The combination of harm severity and harm duration for non-human receptors to determine magnitude of change is given in Table 19-7.

Table 19-7 – Category of Risk for MA&D for Non-human Receptors

		Duration of Harm			
		Short	Medium	Long	Very Long
Severity of Harm	Catastrophic	Medium	High	Very High	Very High
	Major	Low	Medium	High	Very High
	Severe	Low	Low	Medium	High
	Not Significant	Not MA&D			

Significance

- 19.4.22 Guidance provided by IEMA (Ref 19.8) highlights that the context for inclusion of MA&Ds in EIA is to ensure that adequate focus is given to the provision for events leading to significant risk, with the objective of building resilience into a development against such effects.
- 19.4.23 Table 19-8 presents the magnitude of change and a qualitative likelihood scale to determine whether the risk is significant. In the assessment, a significant effect would represent a level of risk that would generally be considered intolerable. A significant effect could include both immediate and delayed effects.

Table 19-8 – Risk Levels for Receptors

Magnitude of Change	Likelihood (per receptor per effect)				
	Remote chance of occurring	Very small chance of occurring	Small chance of occurring	Chance of occurring	Reasonable chance of occurring
Very High	Not Significant	Significant	Significant	Significant	Significant
High	Not Significant	Not Significant	Significant	Significant	Significant
Medium	Not Significant	Not Significant	Not Significant	Significant	Significant
Low	Not Significant	Not Significant	Not Significant	Not Significant	Significant

Assumptions and Limitations

- 19.4.24 To ensure transparency within the EIA process, the following limitations and assumptions have been identified:
- The design of structures and infrastructure will be subject to relevant Hazard Identification (HAZID) and Environmental Impact Identification (ENVIID) studies and actions identified integrated into the final design to reduce risks to be ALARP.
 - Environmental effects associated with unplanned events that do not meet the definition of a major accident and / or disaster (e.g. minor leaks and spills that may be contained within the construction sites) are addressed in the relevant topic chapters and not in this section.

19.5 Baseline Conditions

Existing Baseline

- 19.5.1 The baseline relevant to this topic comprises:
- Features external to the Project that contribute a potential source of hazard to it.
 - Sensitive environmental receptors at risk of significant effect.

- Current (without the Project) MA&D risks for the existing locality.

19.5.2 In accordance with Regulation 5(2) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') (Ref 19.22) the following receptors are considered with regard to MA&D:

- Population and human health.
- Biodiversity.
- Land, soil, water, air, and climate.
- Material assets, cultural heritage, and the landscape.
- The interaction between the factors above.

19.5.3 The potential receptors that may be affected by MA&D have been extracted from the relevant other PEIR chapters as listed in Section 19.1.3. Table 19-9 identifies the major event receptors within the Study Area.

Table 19-9 – Identified Key Receptors for Major Events

Major Event Receptor	Type	Description
Members of the public and local communities	Human health	A variety of communities in North Yorkshire, East Riding of Yorkshire, North Lincolnshire and North East Lincolnshire.
Industrial Estate and Docks	Land	A number of COMAH sites.
Main rivers, ordinary watercourses, canals	Water	Fourteen main rivers including the River Humber and River Trent. The draft Order Limits cross large extents of fluvial and coastal floodplain (initially defined by the extents of EA Flood Zones 2 and 3a).
Coastal environment	Coastal and Intertidal	Yorkshire South WFD Coastal waterbody. Coastal geology.
Landscape designations	Landscape	Two 'Important Landscape Areas' (ILA) lie within the LVIA Study Area: The River Derwent Corridor and Lower Derwent Valley ILA and Goole Moors ILA.
Visual receptors	Visual	Residential communities and recreational receptors.
Ecological Designated Sites	Biodiversity	A total of 29 statutory and 95 non-statutory designated sites have been identified within the Zone of Influence (Zol). The Zol includes a 2km buffer around the draft Order Limits extending for designated sites for bats and wintering / passage birds for internationally designated sites to 10km and for nationally designated sites to 5km.
Arboricultural Features	Biodiversity	A total of seven TPOs have been identified within 50m of the draft Order Limits.

Major Event Receptor	Type	Description
Habitats (including Priority habitats) and Ancient Woodland	Biodiversity	There are five areas of ancient woodland within the Study Area, but none within the draft Order Limits. Several recognised areas of priority habitats are present within the draft Order Limits and wider search area. The draft Order Limits crosses several watercourses, most notably the River Humber and its associated estuarine habitats, also the River Ouse, River Trent and the River Aire.
Protected Species	Biodiversity	A desk study has identified records of several notable / protected species. This will be developed further through a survey and assessment programme.
Heritage assets and archaeology	Cultural Heritage	Within the 500m Study Area heritage assets comprise 137 Listed Buildings, 23 Scheduled Monuments and 6 Conservation Areas.

Future Baseline

- 19.5.4 The Humberside region is predominantly agricultural, with clusters of heavy industry along the Project route. Further industrialisation is expected at Drax, Immingham, and Salt End, as a number of developments are proposed in these locations. These developments are mostly energy projects and connecting utilities, including electricity and gas connections, which have the potential to increase the number of hazardous and COMAH sites across East Riding of Yorkshire, North Lincolnshire and North East Lincolnshire. These future conditions would be factored into the design of the Project, maintaining adequate distances from industry where known and possible. Conversations with the operators and owners of COMAH sites and utilities are ongoing to identify protective provisions and measures required to enable the Project to connect across the region.
- 19.5.5 All risks from existing and future developments are currently controlled by national and international legislation, and the increasing technological safety of industry is likely to not significantly alter the baseline in the future.

19.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 19.6.1 Measures required to mitigate MA&D impacts include:
- Adherence to legislation, engineering standards and good practice.
 - Implementation of Environmental, Health & Safety Management systems.
 - Supplier management environmental, health & safety standards (e.g., Construction Skills Certification Scheme (CSCS)).
 - Risk management systems.
 - Construction and Environmental Management systems (a draft Construction Environmental Management Plan (CEMP) will be provided with the Development Consent Order (DCO) Application and the DCO application will contain a requirement for a CEMP).
 - Management of the construction stage of the Project through the implementation of the Construction Phase Plan (required under the Construction (Design and Management) (CDM) Regulations 2015 (Ref 19.5)).

Embedded Mitigation

- 19.6.2 Confirmed embedded mitigation will be presented within the ES and will align with other technical topics.

19.7 Preliminary Assessment of Potential Impacts

- 19.7.1 As confirmed within the Scoping Opinion, certain aspects of construction phase impacts are addressed within other technical topic chapters. For those assessments, please see:

- Chapter 7: Ecology and Biodiversity, Chapter 18: Hydrology and Land Drainage, and Chapter 20: Coastal Processes for the assessment of impacts on intertidal areas during construction and operation.
- Chapter 8: Climate, for the assessment of extreme weather conditions
- Chapter 10: Ground Conditions and Hydrogeology, for the assessment on mines and storage caverns during the construction and operation phases.
- Chapter 16: Traffic and Transport, for the assessment of construction phase traffic accidents.
- Chapter 18: Hydrology and Land Drainage for the assessment of dam breaches and flood risk.
- Chapter 20: Coastal Processes for the assessment of coastal erosion and landslides

Construction

- 19.7.2 The potential impacts for MA&D associated with the construction phase are provided in Table 19-10.

Table 19-10 – Construction Phase – Preliminary Assessment of Potential Impacts

MA&D event	Resource / Receptor	Description of potential impact / change	Number of people, or Duration of harm (when non-human receptors)	Severity of Harm	Category of Risk	Likelihood	Magnitude of impact / change	Significance of Effect
Accidents during commissioning	Human health (workers)	Accidents during pre-commissioning and commissioning which may lead to serious harm to the Project workforce.	Low	Major	Medium	Very small chance of occurring	High	Not Significant
Damage to existing utilities	Human health (workers)	Construction works causing damage to existing utilities such as power, water, telecommunications or natural gas with the potential for serious harm to the Project workforce and temporary loss of supply to the public.	Low	Major	Medium	Very small chance of occurring	Low	Not Significant
Fires	Human health (workers and public)	Fire in the construction compounds with the potential to cause serious harm to the Project workforce and possibly spread to neighbouring areas.	Medium number of people	Major	Medium	Very small chance of occurring	High	Not Significant
Fires	Non-human receptors	Fire in the construction compounds with the potential to possibly spread to neighbouring areas.	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant
External chemical major accidents	Human health (workers)	A major accident occurring on an external site or third-party pipeline involving hazardous substances causing serious harm to the Project workforce.	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
External chemical major accidents	Non-human receptors	A major accident occurring on an external site or third-party pipeline involving hazardous substances causing serious harm.	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant

Operation

- 19.7.3 The potential impacts for MA&D associated with the operational phase are provided in Table 19-11.

Table 19-11 – Operational Phase – Preliminary Assessment of Potential Impacts

MA&D event	Resource / Receptor	Description of potential impact / change	Number of people, or Duration of harm (when non-human receptors)	Severity of Harm	Category of Risk	Likelihood	Magnitude of impact / change	Significance of Effect
Fires	Human health (workers and public)	Fire at an AGI site could cause damage to the pipework and equipment which may cause a leak of carbon dioxide	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
Fires	Non-human receptors	Fire at an AGI site could cause damage to the pipework and equipment which may cause a leak of carbon dioxide	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant
Unplanned release of carbon dioxide from pipeline or AGI during operation	Human health (workers and public)	The pipelines or AGIs could be affected by external interference or a significant land movement. This could damage the pipelines and subsequently, cause a significant release of carbon dioxide.	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
Unplanned release of carbon dioxide from pipeline or AGI during operation	Non-human receptors	The pipelines or AGIs could be affected by external interference or a significant land movement. This could damage the pipelines and subsequently, cause a significant release of carbon dioxide.	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant
External chemical major accidents	Human health (workers and public)	A major accident occurring on an external site or third-party pipeline involving hazardous substances causing serious harm to the Project workforce or Project assets.	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
External chemical major accidents	Non-human receptors	A major accident occurring on an external site or third-party pipeline involving hazardous substances causing serious harm	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant
Cyber Attack	Human health (workers and public)	Cyber Attacks may result in incorrect / unplanned operation of assets (i.e. shut down or overpressure of pipeline).	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
Cyber Attack	Non-human receptors	Cyber Attacks may result in incorrect / unplanned operation of assets (i.e. shut down or overpressure of pipeline).	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant

Decommissioning

- 19.7.4 The potential impacts for MA&D associated with the decommissioning phase are provided in Table 19-12.

Table 19-12 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

MA&D event	Resource / Receptor	Description of potential impact / change	Number of people, or Duration of harm (when non-human receptors)	Severity of Harm	Category of Risk	Likelihood	Magnitude of impact / change	Significance of Effect
Decommissioning activities: Damage to existing utilities	Human health (workers and public)	Decommissioning works causing damage to existing utilities such as power, water, telecommunications or natural gas with the potential for serious harm to the Project workforce and temporary loss of supply to the public.	Low number of people	Major	Medium	Very small chance of occurring	Low	Not Significant
Decommissioning activities: Damage to existing utilities	Non-human receptors	Decommissioning works causing damage to existing utilities such as power, water, telecommunications or natural gas with the potential for serious harm.	Short duration	Major	Medium	Very small chance of occurring	Low	Not Significant
Decommissioning activities: Fire	Human health (workers and public)	Fire in decommissioning work sites with the potential to cause serious harm to the Project workforce and possibly spread to neighbouring areas.	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
Decommissioning activities: Fire	Non-human receptors	Fire in decommissioning work sites with the potential to cause serious harm and possibly spread to neighbouring areas.	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant
Decommissioning activities: Accidental release of hazardous fluid	Human health (workers and public)	Accidental release of hazardous fluid in construction compounds with the potential to cause serious harm to the Project workforce and spread to neighbouring areas.	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
Decommissioning activities: Accidental release of hazardous fluid	Non-human receptors	Accidental release of hazardous fluid in construction compounds with the potential to cause serious harm.	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant
Decommissioning activities: A major accident occurring on an external site	Human health (workers and public)	A major accident occurring on an external site or third-party pipeline involving hazardous substances causing serious harm to the Project workforce or Project assets.	Low number of people	Major	Medium	Very small chance of occurring	High	Not Significant
Decommissioning activities: A major accident occurring on an external site	Non-human receptors	A major accident occurring on an external site or third-party pipeline involving hazardous substances causing serious harm.	Short duration	Major	Medium	Very small chance of occurring	High	Not Significant

19.8 Additional Mitigation and Enhancement Measures

- 19.8.1 The Project will utilise United Kingdom Onshore Pipeline Operators' Association's (UKOPA) (Ref 19.23) 'Developing Best Practice and Learning Lessons' and the HSE's 'Learning Lessons' (Ref 19.24) guidance to actively promote knowledge sharing and foster best practice, working in collaboration with UKOPA and HSE to influence the development of standards and safety management principles.

19.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 19.9.1 The preliminary assessment of potential significant effects associated with the Project has concluded there will be no significant effects in relation to MA&D.

19.10 Next Steps

Design Development and Engagement

- 19.10.1 Due to the iterative nature of the design process, stakeholder engagement will continue after the statutory consultation period. Engagement will be undertaken with the HSE, relevant carbon capture projects, relevant electricity generators, distributors and transmitters, public gas transporters and telecommunication providers, alongside relevant local authorities and relevant parish councils.
- 19.10.2 This will help to inform and refine the design in order to ensure that the vulnerability of the Project to MA&Ds is ALARP.

Further Assessment

- 19.10.3 As the design and the EIA evolves, further work is required to ensure a robust assessment of the vulnerability of the Project to MA&D. This will include a review and update of the potential MA&D events identified in Volume 4 - Appendix 19.1: Scoping Assessment of MA&D, following the receipt of further detailed design information.

19.11 References

- Ref 19.1 – HMSO (1974) Health and Safety at Work Etc. Act 1974 (HSWA)

- Ref 19.2 – HMSO (2015) Control of Major Accident Hazards (COMAH) Regulations 2015
- Ref 19.3 – HMSO (1996) Pipelines Safety Regulations (PSR) 1996
- Ref 19.4 – HMSO (2000) Pressure Systems Safety Regulations (PSSR) 2000
- Ref 19.5 – HMSO (2015) Construction (Design and Management) Regulations 2015 (CDM Regulations)
- Ref 19.6 – Department for Energy Security & Net Zero (2023) Overarching National Policy Statement for Energy (EN-1)
<https://assets.publishing.service.gov.uk/media/65bbfdbc709fe1000f637052/overarching-nps-for-energy-en1.pdf>
- Ref 19.7 – Department for Energy Security & Net Zero (2023) National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)
<https://assets.publishing.service.gov.uk/media/65a789a8867cd8000d5ae9be/nps-natural-gas-supply-infrastructure-pipelines-en4.pdf>
- Ref 19.8 – Institute of Environmental Management and Assessment's (IEMA) 'Major accidents and disasters in EIA: A primer' Available at:
<https://www.iema.net/content/major-accidents-and-disasters-in-eia-an-iema-primer-october-2020/#:~:text=Major%20accidents%20and%20disasters%20should,minor%20clean%20Dup%20and%20restoration>
- Ref 19.9 – The Health and Safety Executive's (HSE) Reducing Risks, Protecting People (R2P2)
- Ref 19.10 – The Chemical and Downstream Oil Industries Forum
https://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf
- Ref 19.11 – HSE RR1035 Update of pipeline failure rates for land use planning assessments <https://www.hse.gov.uk/research/rrhtm/rr1035.htm>
- Ref 19.12 – UK Onshore Pipeline Operator's Association (UKOPA) Pipeline Product Loss Incidents and Faults Report (1962 – 2019)
<https://www.ukopa.co.uk/wp-content/uploads/2021/07/UKOPA-Product-Loss-Incidents-Faults-Report-1962-2019-1.0-July-2021.pdf>
- Ref 19.13 – HSE Failure Rate and Event Data for use within Risk Assessments <https://www.primatech.com/images/docs/failure-rates.pdf>
- Ref 19.14 – HSE (2019). Update of aircraft crash rates used by HSE in assessing hazards from chemical, process and other major hazard installations. Research Report 1140. (online) Available at:
<https://www.hse.gov.uk/research/rrpdf/rr1140.pdf>

- Ref 19.15 – HSE (1994). Risks from Hazardous Pipelines in the United Kingdom. Contract Research Report 82. (online) Available at: https://www.hse.gov.uk/research/crr_pdf/1994/crr94082.pdf
- Ref 19.16 – National Risk Register Of Civil Emergencies https://assets.publishing.service.gov.uk/media/5a82a189e5274a2e8ab5887d/UK_National_Risk_Register_2017.pdf
- Ref 19.17 – British Geological Society (2024) GeoIndex Onshore <https://mapapps2.bgs.ac.uk/geoindex/home.html>
- Ref 19.18 – United Nations Office for Disaster Risk Reduction <https://www.preventionweb.net/publication/europe-tsunami-hazard-map>
- Ref 19.19 – Centre for Research on the Epidemiology of Disasters, International Disaster Database <https://www.emdat.be/>
- Ref 19.20 – HSE COMAH 2015 Public Information Search
- Ref 19.21 – The Coal Authority <https://datamine-cauk.hub.arcgis.com/>
- Ref 19.22 – The EIA regulations
- Ref 19.23 - UKOPA (2022) Developing Best Practice and Learning Lessons. Available at: <https://www.ukopa.co.uk/developing-best-practice-and-learning-lessons/>
- Ref 19.24 - HSE (2022) Learning Lessons. Available at: <https://www.hse.gov.uk/managing/delivering/act/learn-lessons.htm>

20 Coastal Processes

20.1 Introduction

- 20.1.1 This chapter presents the preliminary findings of the Environmental Impact Assessment (EIA) undertaken to date for the assessment of Coastal Processes at the pipeline landfall at Easington and also the two principal estuary crossings. The preliminary assessment is based on information obtained to date. It should be read alongside the description of the Project provided in Chapter 2: Project Description.
- 20.1.2 This chapter describes the methodology used, the datasets that have informed the preliminary assessment, baseline conditions, mitigation measures, and the preliminary Coastal Processes effects that could result from the Humber Carbon Capture Pipeline (HCCP) Project ('the Project').
- 20.1.3 This chapter should be read in conjunction with the following chapters due to the fact a number of technical disciplines relate to the coastal environment:
- Chapter 4: EIA Methodology.
 - Chapter 7: Ecology and Biodiversity – due to the close association between intertidal ecology and coastal processes.
 - Chapter 8: Climate – due to the influence of climate change on accelerating coastal erosion.
 - Chapter 10: Ground Conditions and Hydrogeology – due to the interactions between geological features and coastal processes.
 - Chapter 14: Socio-economics, Tourism and Recreation – due to the potential for impacts on fisheries as a result of construction works at the Easington Landfall.
 - Chapter 16: Traffic and Transport due to the potential for impacts on other maritime users as a result of construction works.
 - Chapter 18: Hydrology and Land Drainage due to close association between hydrological features and coastal processes.
 - Chapter 19: Major Accidents and Disasters due to the interactions on intertidal areas during construction and operation.
 - Chapter 21: Cumulative Effects due to the potential cumulative coastal processes impacts.
- 20.1.4 This chapter is supported by the following figures:
- Figure 20.1: Coastal Processes Study Area

- 20.1.5 This chapter is supported by the following appendices:
- Appendix 7.3: Intertidal and Marine Technical Appendix

20.2 Legislation, Policy and Guidance

Legislation

- 20.2.1 Legislation relevant to Coastal Processes is detailed in Table 20-1. Other relevant legislation in relation to coastal habitats and coastal water quality impacts is captured within the retrospective chapters as identified above.

Table 20-1 – Summary of Legislation relevant to Coastal Processes

Legislation	How it is considered within this PEIR
Coast Protection Act 1949 (HM Government, 1949) (Ref 20.1)	Relates to the protection of the coast against erosion. The Project will assess the potential effects on coastal erosion, sediment transport, and encroachment by the sea. This legislation is noted here due to the offshore EIA project's interface with the landfall element of this Project.
Petroleum Act 1998 (HM Government, 2009) (Ref 20.2)	Establishes the North Sea Transition Authority (NSTA) as the licensing / consenting authority for construction and operation of subsea pipelines, including carbon dioxide and hydrogen pipelines, and is noted here due to the offshore EIA project's interface with the landfall element of this Project.
The Countryside and Rights of Way Act 2000 (HM Government, 2010) (20.3)	Extends the ability of the public to enjoy the countryside whilst also providing safeguards for Land Owners / Land Occupiers Accordingly, the Countryside and Rights of Way Act 2000 gives a statutory right of access to open country and registered common land; modernises the rights of way system; gives greater protection to Sites of Special Scientific Interest (SSSI); provides better management arrangements for National Landscapes, formerly known as Areas of Outstanding Natural Beauty (AONBs); and strengthens wildlife enforcement legislation. The Project will consider whether works have the potential to affect access to designated coastal areas. Works have the potential to affect access to designated coastal areas.
Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009) (Ref 20.4)	Provides a system for marine management, including a planning system and system for the licensing of activities in the marine environment, as well as providing for the designation of conservation zones. Ensures that the Project is undertaken in compliance with marine licensing requirements and coastal impacts are assessed in accordance with sustainable management of the marine environment.
Flood and Water Management Act 2010	Makes provisions for the management of risks in connection with flooding and coastal erosion. The Project will assess potential changes in coastal flood risk due to project-related alterations to sediment transport and hydrodynamics.

Legislation	How it is considered within this PEIR
(HM Government, 2010) (Ref 20.5)	
Environmental Damage (Prevention and Remediation) (England) Regulations, 2015 SI 810 (HM Government, 2015) (Ref 20.6)	Established a legal framework for preventing and remediating environmental damage, requiring mitigation of significant adverse impacts on coastal waters, protected habitats, and species. The Project will assess the risk of environmental damage from changes in coastal processes and identify appropriate mitigation measures as necessary.

Policy

National Planning Policy

- 20.2.2 National Planning Policy relevant to Coastal Processes is detailed in Table 20-2. These include the Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2023a) (Ref 20.7) and the National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (DESNZ, 2023b) (Ref 20.8).

Table 20-2 – Summary of National Planning Policy relevant to Coastal Processes

Planning Policy Reference	Policy Context	How it is considered within this PEIR
EN-1	5.4 “<i>Conservation of biodiversity and geology (relating to the sites that are designated for their geology and/or their geomorphological importance). This section sets out the government’s aims (paragraph 5.4.2) and specifies the following expectations concerning the conservation of biodiversity and EIA:</i> <i>The ES should clearly and proportionately set out the potential effects including those on designated sites, protected species and habitats, other species identified as being of principal importance, and where EIA is not required (5.4.17 and 5.4.18) and include appropriate avoidance, mitigation, compensation and enhancement measures as an integral part of the proposed development (5.4.32 and 5.4.35)”.</i>	The Coastal Processes assessment will consider the effects and resulting impacts on the coast’s Geological SSSI and Regionally Important Sites. This will further be considered within relevant chapters, i.e., Chapter 7: Ecology and Biodiversity and Chapter 10: Ground Conditions and Hydrogeology.
EN-1	5.6 “<i>Where onshore infrastructure projects are proposed on the coast, coastal change is a key consideration as well as a vital element of climate change adaptation”</i>	The Coastal Processes assessment will consider the effects and resulting impacts likely to cause physical change to the shoreline, i.e. erosion, coastal landslip, permanent inundation and coastal accretion.

Planning Policy Reference	Policy Context	How it is considered within this PEIR
EN-4	2.23 <i>“Where a project is likely to have adverse effects on the soil and geology, an assessment of the impacts should be included in the ES.”</i>	The Coastal Processes assessment will consider the effects and resulting impacts on the coastal geology, including the likely impacts resulting in changes to shoreline erosion and accretion, associated with the Project.

Local Planning Policy

20.2.3 Local Planning Policies relevant to Coastal Processes is detailed in Table 20-3

Table 20-3 – Summary of Local Planning Policy relevant to Coastal Processes

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
East Riding Local Plan (East Riding of Yorkshire Council, 2016) (Ref 20.9)	S2: Addressing climate change	<i>“The Local Plan and development decisions will support a reduction in greenhouse gas emissions and adaptation to the expected impacts of climate change.”</i> The Local Plan includes a table stating how this policy will be delivered. Relevant to this chapter, this covers promoting efficient use of water resources, building-in climate change resilience and flood management.	The PEIR considers the requirements of Policy S2 by assessing potential impacts related to climate change of relevance to the coastal processes receptor. Embedded mitigation measures are proposed to ensure climate change resilience is integrated into the Project design, following the guidance provided by the Local Plan. Please also refer to Chapter 8: Climate Resilience (i.e., Pump Facility distance from cliff top, sufficient burial depth of pipeline etc. to ensure it does not become exposed over the lifetime of the Project).
East Riding Local Plan (Ref 20.9)	ENV6: Managing environmental hazards	<i>“Environmental hazards, such as flood risk, coastal change, groundwater pollution and other forms of pollution, will be managed to ensure that development does not result in unacceptable consequences to its users, the wider community, and the environment.”</i>	The PEIR addresses Policy ENV6 by evaluating how coastal change may affect coastal processes and adjacent environments. It includes assessments of proposed mitigation measures aimed at enhancing resilience against coastal change, ensuring that potential hazards are managed to prevent unacceptable consequences to users, communities, and natural features as outlined in the Local Plan.
East Riding Local Plan (Ref 20.9)	Policy ENV4: Conserving and enhancing biodiversity and geodiversity	“ENV-4: A. Proposals that are likely to have a significant effect on an International Site will be considered in the context of the statutory protection which is afforded to the site. B. Proposals that are likely to have an adverse effect on a National Site (alone or in combination) will not normally be permitted, except where the benefits of development in that location clearly outweigh both the impact on the site and any broader impacts on the wider network of National Sites. C. Development resulting in loss or significant harm to a Local Site, or habitats or species supported by Local Sites, whether directly or indirectly, will only be supported if it can be demonstrated there is a need for the development in that location and the benefit of the development outweighs the loss or harm. D. Where loss or harm to a National or Local designated site cannot be prevented or adequately mitigated, as a last resort, compensation for the loss / harm must be agreed. Development will be refused if loss or significant harm	The PEIR considers Policy ENV4 by assessing how implications for coastal processes could impact biodiversity and geodiversity receptors, particularly where habitats are at risk from erosion or saline intrusion. The assessment includes proposed measures to avoid or mitigate harm to protected sites, maintain habitat connectivity, and achieve biodiversity net gain through habitat enhancement and restoration where possible. Impacts to the National Site Network will also be considered in the relevant chapters, i.e., Chapter 10: Ground Conditions and Hydrogeology and Chapter 7: Ecology and Biodiversity.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		cannot be prevented, adequately mitigated against or compensated for. E. Proposals should further the aims of the East Riding of Yorkshire Biodiversity Action Plan, designated Nature Improvement Areas (NIAs) and other landscape-scale biodiversity initiatives. To optimise opportunities to enhance biodiversity, proposals should seek to achieve a net gain in biodiversity where possible and will be supported where they: 1. Conserve, restore, enhance or recreate biodiversity and geological interests including the Priority Habitats and Species (identified in the ERYBAP) and Local Sites (identified in the Local Sites in the East Riding of Yorkshire). 2. Safeguard, enhance, create and connect habitat networks in order to: i. protect, strengthen and reduce fragmentation of habitats; ii. create a coherent ecological network that is resilient to current and future pressures; iii. conserve and increase populations of species; and iv. promote and enhance green infrastructure.”	
North East Lincolnshire Local Plan 2013 to 2032 (North East Lincolnshire Council, 2018) (Ref 20.10)	Policy 9: Habitat Mitigation – South Humber Bank	Within the Mitigation Zone identified on the Policies Map, proposals which adversely affect the Humber Estuary SPA / Ramsar site due to the loss of functionally linked land will normally be required to provide their own mitigation in order to comply with the requirements of the Habitats Regulations.	The PEIR applies Policy 9 by examining how changes to coastal processes consequent of the Project might contribute to habitat loss within the Mitigation Zone, particularly affecting functionally linked land for the Humber Estuary Special Protection Area (SPA) / Ramsar site. Please also refer to Chapter 7: Ecology and Biodiversity for a full assessment with respect to the Humber Estuary Special Area of Conservation (SAC) / SPA.
	Policy 41: Biodiversity and Geodiversity	<i>The Council will have regard to biodiversity and geodiversity when considering development proposals, seeking specifically to:</i> <i>A. establish and secure appropriate management of, long-term mitigation areas within the Estuary Employment Zone, managed specifically to protect the integrity of the internationally important biodiversity sites.</i> <i>B. designate Local Wildlife Sites (LWSs) and Local Geological Sites (LGSS) in recognition of particular wildlife and geological value.</i>	The PEIR addresses Policy 41 by evaluating the potential for coastal processes to disrupt biodiversity features, including designated sites and priority habitats within the ecological network. Proposed mitigation aims to prevent habitat fragmentation, enhance resilience to coastal change, and restore biodiversity where necessary.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		<i>C. protect manage and enhance international, national and local sites of biological and geological conservation importance, having regard to the hierarchy of designated sites, and the need for appropriate buffer zones.</i> <i>D. minimise the loss of biodiversity features, or where loss is unavoidable and justified ensure appropriate mitigation and compensation measures are provided;</i> <i>E. create opportunities to retain, protect, restore and enhance features of biodiversity value, including priority habitats and species;</i> <i>F. take opportunities to retain, protect and restore the connectivity between components of the Borough's ecological network.</i>	
East Inshore and East Offshore Marine Plan (Department for Environment, Food and Rural Affairs (Defra), 2014) (Ref 20.11)	CC1 (Climate change), CC2 (Climate adaptation), ECO1 (Ecosystem approach), and PS2 (Proposals for infrastructure).	<i>The Marine Plans set out policies to ensure that development proposals account for climate change, maintain and enhance ecosystem services, and safeguard infrastructure in the marine environment. For coastal processes, relevant provisions include adapting to physical changes, protecting the resilience of the coastline, and integrating with terrestrial planning.</i>	The PEIR considers relevant Marine Plan policies by assessing how the Project design addresses climate change resilience, avoids or mitigates adverse effects on ecosystem services related to sediment transport and shoreline stability, and aligns with integrated marine–terrestrial management. The assessment ensures compliance with the plan objectives and the principles of the Marine Policy Statement.
North East Inshore and North East Offshore Marine Plan (Defra, 2021) (Ref 20.12)	NE-CC-1 (Climate change adaptation), NE-MER-1 (Marine environment resilience), NE-BIO-1 (Biodiversity protection), NE-INF-1 (Infrastructure safeguarding).	<i>The Marine Plan provides a policy framework for sustainable development in the North East marine plan area, emphasising adaptation to climate change, safeguarding marine biodiversity, and maintaining the resilience of physical processes.</i>	The PEIR addresses these relevant policies by evaluating the effects of the Project on sediment transport, erosion, and hydrodynamics, ensuring that resilience is embedded in the design. Measures are proposed to safeguard marine habitats and infrastructure in line with the policy requirements.
Flamborough Head to Gibraltar Point Shoreline Management Plan (SMP) (Humber Estuary Coastal Authorities Group, 2010) (Ref 20.13)	Flamborough Head to Gibraltar Point SMP	<i>The SMP provides a strategic approach to managing flood and erosion risk along the Holderness coastline, including at Dimlington and adjacent areas.</i>	The PEIR takes account of SMP policies to ensure that the Project does not compromise long-term shoreline management objectives, particularly where the SMP promotes adaptation to natural erosion processes. Design and mitigation measures are aligned with SMP policy intent.
The Humber Flood Risk Management Strategy (Environment Agency (EA), 2008) (Ref 20.14)	The Humber Flood Risk Management Strategy	<i>The Humber Strategy is relevant to the Project in considering flood risk to landfall works and potential impacts on estuarine processes.</i>	The PEIR evaluates potential changes to coastal processes that could influence flood risk in the Humber area and ensures that construction and operational activities do not compromise existing defences or strategic flood management objectives.

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Humber 2100+ Sustainability Appraisal: Final Scoping Report (Jacobs, 2020) (Ref 20.15)	The Humber 2100+ initiative	<i>The appraisal identifies the need for adaptive, sustainable measures that balance economic, environmental, and social objectives.</i>	The PEIR considers Humber 2100+ principles by assessing how the Project's design integrates climate resilience and avoids constraining future flood risk management options, particularly around the Humber Estuary frontage.

Guidance

- 20.2.4 The Coastal Processes assessment has been carried out in accordance with the following guidance:
- Guidance for Pollution Prevention series (Environmental Agency, various publication dates) (Ref 20.16).
 - EIA guidance (e.g., Guidance, Environmental Impact Assessment (Ministry of Housing, Communities and Local Government et al., 2014a) (Ref 20.17) - Outlines requirements for assessing environmental impacts, including coastal process impacts, under relevant legislation (primarily the Town and Country Planning Act 1990).
 - EA and Marine Management Organisation (MMO) guidance - Provides specific guidance on licensing, habitat protection, and Flood Risk Assessment (FRA) for development in coastal and marine areas (i.e., Planning and development: Marine licenses (MMO, 2023) (Ref 20.18), Guidance, Flood risk and coastal change (Ministry of Housing, Communities and Local Government et al., 2014b) (Ref 20.19).

20.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 20.3.1 A summary of relevant parts of the EIA Scoping Opinion from the Planning Inspectorate (PINS) and our responses to this Scoping Opinion are outlined in Table 20-4 below.

Table 20-4 – Summary of Scoping Opinion relevant to Coastal Processes

Section Reference	Matter	Comments	Response
ID 3.15.1	Pipeline burial	“The Scoping Report states that once construction works and reinstatement are complete, all infrastructure in the intertidal zone would be buried to a suitable depth of cover and no operational discharges are proposed. The Inspectorate notes the proposed monitoring measures to ensure the pipeline does not become exposed and agrees that significant effects during operation are not likely. This matter can be scoped out of the ES. The Inspectorate also agrees significant effects during decommissioning are not likely given the pipeline would remain in-situ following decommissioning; this matter can be scoped out of the ES.”	Noted. No action required.
ID 3.15.3	Pipeline impacts at Easington Landfall	“The Inspectorate is content that once the pipeline working width is reinstated, there would be no impact pathway and therefore significant effects are not likely. This matter can be scoped out of the ES.”	Noted. No action required.
ID 3.15.6	Pipeline impacts at Easington Landfall	“On the basis that the pipeline would remain in-situ, the Inspectorate agrees that significant effects during decommissioning are unlikely and that this matter can be scoped out of the ES.”	Noted. No action required.
ID 3.15.9	Operational impacts	“The Scoping Report states that there are no perceivable operational impacts to these receptors during operation. This is on the basis that the pipeline would remain in-situ and decommissioning activities and associated impacts would likely be restricted to AGI locations and therefore encompassed in Chapter 7 – Ecology and biodiversity. The Inspectorate agrees that significant effects are not likely and that this matter can be scoped out of the ES.”	Noted. No action required.
ID 3.15.10	Coastal environment at Easington Landfall - Content of chapter	“As noted by the EA, this aspect chapter does not fully reflect the title as it covers only coastal and intertidal impacts around the landfall. The applicant should ensure that the ES covers all intertidal areas which could be impacted by the proposed development and that clear signposting is included within the ES.”	The scope of Chapter 19 at Scoping was to solely capture the intertidal environment of the Project at the Easington Landfall. At PEIR the intertidal discipline has been fed directly into a number of relevant chapters. This chapter (previously Chapter 19 at Scoping) now only captures coastal processes as a receptor. The same approach will be followed at ES. Standalone marine chapters have not been produced due to considerable overlap with the offshore project and limited interaction of Project scope with the marine environment. Rather, a high-level overview has been given for relevant receptors in relation to the Project with cross reference given to the offshore project where necessary. This has included capturing an assessment on: intertidal ecology, intertidal geology, intertidal hydrology, coastal processes, commercial fisheries (high level) and shipping. Additional marine receptors were not considered either due to limited impact pathways or sufficient coverage as part of the offshore project.

Section Reference	Matter	Comments	Response
			This will remove unnecessary duplication of the intertidal scope, but will also ensure the intertidal receptors are sufficiently captured. This applies to all responses to the Scoping Report on this topic, they have not all been repeated here to save duplication.
ID 3.15.11	Pipeline impacts at Easington Landfall	“The ES should identify the chosen burial depth at the landfall and provide evidence to support the assumption that erosion would not result in exposure during the operational lifetime of the proposed development.”	Sufficient burial depth has been deemed to be embedded mitigation of the Project. This has been considered throughout the PEIR, and will be further assessed and reported in the ES when more information is available.
EA Section 19.8.29 Page 105	Coastal Processes	“The phrase ‘increased beach profile’ is not clear, leading to potential for misunderstanding. What has increased? Should this be ‘steeper’?”	An increased beach profile refers to the changes in elevation over the width of the beach; steeper can also be used.
EA Section 3.6.50–62	Coastal Processes	“It is good to see that cliff erosion and foreshore lowering at the landfall location have been taken into account regarding the installation of pipes at landfall, and that different methods are being investigated. Micro-tunnelling would probably be the least preferred option as it would require works in the intertidal zone, which may have an effect on coastal processes at the landfall location. Plus, it would also require the excavation of an access track through the cliffs, to allow access to the foreshore. This activity may change the characteristics of the cliffs at this point and, dependent on the method of reinstatement either exacerbate erosion or introduce a hard-point.”	Noted. The PEIR assesses the worst-case scenario as part of the impact assessment, with design to be refined until the submission of the Development Consent Order (DCO).
MMO Page 147	Coastal Processes	“The MMO asks the applicant to model coastal processes over time; and to review the proposed depth of the pipeline. The MMO notes that the applicant has stated that the pipeline will be a minimum of 1.2 m deep overall and 10 m deep for the Humber crossing, however, this appears shallow. Please confirm how coastal processes have been taken into consideration to ensure natural processes won’t expose the pipeline. The methodology of the coastal processing modelling; and the data sources should be provided within the ES. It is noted that the applicant is using a 15 km study area for coastal processes (see Figure 19.1, Volume 3).”	Extensive modelling has been undertaken as part of the Offshore Environmental Statement for the Northern Endurance Partnership (NEP) project, and it is understood that further modelling of coastal processes will be undertaken. As such, it is not deemed necessary to duplicate these studies but instead interpret them to inform the impacts assessment to the intertidal Study Area at the Easington Landfall. Additional field surveys at the landfall were also undertaken April 2025. Sufficient pipeline burial has been taken as embedded mitigation throughout the PEIR.

Summary of Engagement

- 20.3.2 The engagement taken to date, and how it has been considered within the assessment process is outlined in Table 20-5 below.

Table 20-5 – Summary of Stakeholder Engagement relevant to Coastal Processes

Consultee	Date and method of engagement	Summary of issues raised	Response
ERoY	31 st July 2025 Online consultation meeting	The East Riding of Yorkshire Council (ERoY) highlighted the importance of incorporating the most up-to-date local datasets on coastal change into the assessment. Specific matters discussed included: • Updated measured rates of cliff erosion along the Holderness coastline, including site-specific data relevant to the proposed landfall location. • Observed and projected cliff retreat patterns and their implications for landfall siting and infrastructure protection.	All aspects raised in the meeting have been duly noted and will be captured at PEIR and ES, including the consideration of newly provided coastal erosion data.
Natural England	13 th March 2025 Online consultation meeting	Discussion on the intertidal scope of the Project, specifically the consent pathway. Issues raised involved those highlighted within the Scoping Opinion, Coastal processes was deliberated and potential impacts outlined, including the approach that would be undertaken for the PEIR and ES. Notably, the scope of the intertidal scope was delivered to the EA, and how this would form part of the coastal processes assessment.	All aspects raised in the meeting have been duly noted and will be captured at PEIR and ES.

Consultee	Date and method of engagement	Summary of issues raised	Response
MMO	24 th February 2025 Online consultation meeting	Discussion on the intertidal scope of the Project, specifically the consent pathway. Issues raised involved those highlighted within the Scoping Opinion, notably the intertidal scope at both Easington, the Humber crossing and River Trent; of relevance to this chapter was discussion on Easington. Coastal processes were deliberated and potential impacts outlined, including the approach that would be undertaken for the PEIR and ES.	All aspects raised in the meeting have been duly noted within this chapter and will be further captured in the ES for the Easington Landfall, and River Humber and tidal River Trent crossings.
ERoY	14 th February 2025 Online consultation meeting	Consultee comment in relation to the Pump Facility its risk to coastal erosion. The issue focussed largely on concern regarding the longevity of the Pump Facility given rates of coastal erosion in this area.	The footprint provided at Scoping was indicative. This has moved further west, remaining in the same land parcel and within the draft Order Limits.

20.4 Assessment Methodology

Baseline Data

Study Area

- 20.4.1 The Study Area for the assessment is proposed to encompass the Easington Landfall, and the Humber and tidal River Trent estuary crossings including a 500 m buffer. This Study Area is expanded to 15 km offshore and along the shorelines for the consideration of coastal processes, to effectively capture the dynamic sediment regime. The 15 km radius was informed by indicative tidal excursion ellipses from the UK Marine Renewables Atlas (ABPmer, 2025) (Ref 20.20), which informed the coasts typical extent of sediment transport within a tidal cycle. These Study Areas are considered, based on the nature of Project construction, operation, and decommissioning activities to appropriately capture those impacts within the immediate and the wider Study Area (Figure 20.1).
- 20.4.2 The assessment focuses on the coastal processes at the Easington Landfall, and tidal River Trent and River Humber crossings (noting that no impacts on coastal processes are envisaged at these crossings, see Section 20.7), encompassing the intertidal zone down to Mean Low Water Springs (MLWS), where the Project meets the DCO limit for consent with the offshore carbon dioxide transportation and storage infrastructure project. This area captures the direct impact zone, where hydrological and geological dynamics may influence or be influenced by the Project. The Study Area with respect to coastal processes for the PEIR is illustrated in Figure 20.1
- 20.4.3 Part of the Humber estuary lies within the Study Area, a transitional estuarine environment influenced by both fluvial and marine processes, characterised by macro-tidal conditions and active sediment transport. Consideration of hydrological impacts has been noted within Chapter 18: Hydrology and Land Drainage.
- 20.4.4 Additional consideration is afforded to sensitive features, such as areas of rapidly eroding cliffs (i.e. Dimlington Cliffs SSSI) and Spurn Head to the south, a key feature of the Holderness coast. Spurn Head plays a crucial role in protecting the Humber estuary from extreme weather events, thereby supporting its continued function as an industrial and port hub.

Baseline Data Collection

- 20.4.5 This Section outlines a preliminary assessment of the baseline conditions that has been used to inform a detailed assessment of coastal processes receptors that will be reported in the ES.

Desk Study Sources

- 20.4.6 Baseline conditions of the Project were established during a desk study using the following sources:
- Southern North Sea Sediment Transport Study (HR Wallingford et al., 2002) (Ref 20.21).
 - Southern North Sea longshore sediment transport (Sutherland et al., 2002) (Ref 20.22).
 - Flamborough Head to Gibraltar Point SMP Appendix C: Assessment of Coastal Behaviour and Baseline Scenarios (Ref 20.13).
 - East Riding of Yorkshire Council Coastal Explorer (ERoY, 2025a) (Ref 20.23).
 - NEP Integrated Site Survey – 2021 Environmental Baseline Report (Gardline, 2022a) (Ref 20.24).
 - NEP Integrated Site Survey – Environmental Survey Habitat Assessment (Gardline, 2022b) (Ref 20.25).
 - Aerial imagery and mapping.
 - Multi-Agency Geographic Information for the Countryside (MAGIC) (Defra, 2025) (Ref 20.26).
 - Geology Viewer (British Geological Survey (BGS), 2025a) (Ref 20.27).
 - Records and geo-environmental data held by Local Planning Authority (LPA) relating to current and historical contaminative land uses, including waste sites, where provided.
 - Records and geo-environmental data held by LPAs relating to Regionally Important Geological Sites (RIGS) and quarrying / mining sites, where provided.
 - Site walkover of areas of interest such as the intertidal area at Easington Landfall.
 - Published geological maps and the Geographic Information Systems (GIS) data sourced from the BGS (Map Sheet No. 86 Hull, the Estuary of the Humber, Goole, Caistor, Brigg, Bedrock, (1891) (BGS, 2025b) (Ref 20.28); Map Sheet No. 80 Kingston upon Hull, Solid (1983) (BGS, 2025c) (Ref 20.29)) indicate that the Project is underlain by the geological succession.

20.4.7 A number of other site-specific studies and publicly available reports that have informed this work are as follows:

- UK Marine Renewables Atlas (Ref 20.20).
- The East Riding Coastline: Past, Present and Future (Ref 20.28).
- East Riding Coastal Monitoring Programme, Seabed Mapping: Flamborough Head to Spurn Point (Ref 20.29).

20.4.8 Baseline collection on sediment transport and coastal morphology has been derived from secondary sources of information. This has been carried out by means of a desk-based study assessing historical shoreline position data for the coastline around the Easington Landfall and reviewing existing modelling data of the degree of coastal erosion reported in the Offshore Environmental Statement (Ref 20.30). Data has also been sourced from published literature, and information provided by the EA and EROy during consultation in order to support these assessments.

Site Visits and Surveys

20.4.9 To supplement the understanding of the baseline conditions, a walkover and sampling survey has been undertaken at the Easington Landfall. This comprised a single survey activity during April 2025 over a single spring tidal period. The results of this survey will be processed, interpreted and an update to the preliminary survey results outlined within this chapter will be reported in the ES.

20.4.10 A preliminary shoreline survey was previously undertaken at the Easington Landfall in June 2022.

Impact Assessment Methodology

20.4.11 The overall assessment methodology for the Project is provided in Chapter 4: EIA Methodology. The approach within this chapter builds upon this approach.

Sensitivity

20.4.12 The sensitivity of coastal processes receptors can be defined as follows:

- High: Very low or no capacity to accommodate the proposed form of change; and / or receptor designated and / or of international level importance. Likely to be rare with minimal potential for substitution. May also be of very high socioeconomic importance.
- Medium: Moderate to low capacity to accommodate the proposed form of change; and/or receptor designated and / or of regional level importance.

Likely to be relatively rare. May also be of moderate socioeconomic importance.

- Low: Moderate to high capacity to accommodate the proposed form of change, and / or receptor not designated but of district level importance.
- Very low: High capacity to accommodate the proposed form of change; and / or receptor not designated and only of local level importance.

Magnitude of Effect

20.4.13 The assessment is based on a description of the anticipated activities associated with the Project. The impacts that are predicted as a result of these activities and the area over which such effects might be experienced by different receptors.

20.4.14 In determining the magnitude of an impact, reference will be made to the following characteristics (Table 20-6):

- Positive or negative.
- Spatial extent.
- Duration (assessed for the purposes of this chapter as either 'short-term' (up to one year), 'medium-term' (one – ten years) or 'long-term' (greater than ten years).
- Frequency and timing.
- Reversibility.

Table 20-6 – Definitions of Magnitude Levels

Magnitude	Description
High	Impact occurs over a large spatial scale and / or is long-term or permanent in nature. High frequency (i.e., occurring routinely or continuously for a long period of time) and / or at high intensity. Impact and its effects will continue for more than five years following cessation of activities, potentially irreversible.
Medium	Impact occurs over a local to medium spatial scale and / or has a short to medium-term duration. Medium to high frequency (i.e., occurring routinely or continuously for a moderate length of time) and / or moderate intensity or occurring intermittently for short periods of time at moderate to high intensity.

Magnitude	Description
	Impact likely to be mitigated through natural processes (or mitigation measures) within a few years of cessation of activities (1 – 5 years)
Low	Impact is small-scale and localised and is of temporary or short-term duration. Low frequency, occurring occasionally or rarely for short time periods and / or at low intensity. Recovery / impact likely to be mitigated through natural processes (or mitigation measures) within a year of cessation of activities
Negligible	Impact is highly localised (small-scale) and short-term in nature. Transient – limited to the duration of the activity in question

Significance

- 20.4.15 The assessment of likely significant environmental effects as a result of the Project considers the construction, operational and decommissioning phases. Significance of the effect is typically a function of the sensitivity of the receptor and the magnitude of an impact. The definitions of which are presented within Table 20-7.

Table 20-7 – Definitions of Significance

Significance	Definition
Major	Very large or large, beneficial or adverse, change in receptor, where the development would cause a considerable (e.g., highly noticeable / long term) improvement or deterioration of the existing environment.
Moderate	Intermediate or large, beneficial or adverse, change in receptor, where the development would cause a noticeable improvement or deterioration of the existing environment.
Minor	Small, beneficial or adverse, change in receptor where the development would cause a barely perceptible improvement or deterioration of the existing environment.

Neutral	No discernible beneficial or adverse change in receptor, where the development would cause a barely perceptible improvement or deterioration of the existing environment.

20.4.16 An impact matrix is presented within Table 20-8.

Table 20-8 – Impact Significant Matrix

Sensitivity	Magnitude			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Neutral
Medium	Major	Moderate	Minor	Neutral
Low	Moderate	Minor	Neutral	Neutral
Very low	Neutral	Neutral	Neutral	Neutral

Assumptions and Limitations

20.4.17 To ensure transparency within the EIA process, the following limitations and assumptions have been identified at this stage:

- The assessment will rely on available data, and while reasonable efforts will be made to ensure the data is accurate and up to date, the accuracy of third-party information cannot be guaranteed.
- The assessment of construction effects on the intertidal zone will be qualitative, informed by a baseline assessment of cliff and shore platform erosion at the Easington Landfall, as well as an assessment of coastal processes, alongside a desk study being conducted for the Offshore Environmental Statement.
- Sampling of intertidal sediments at the Easington Landfall April 2025 survey will be analysed to establish baseline physical characteristics and contaminant levels.

20.5 Baseline Conditions

Existing Baseline

20.5.1 The following receptors have been identified for coastal processes:

- Statutory designated sites (i.e. Dimlington Cliffs SSSI.).

- Marine Conservation Zones (MCZ) (i.e. protected features of the Holderness Inshore MCZ) (to be assessed within a separate the MCZ assessment).
- Sediment transport regimes (including disturbance of sediment supply to protected sites down-drift of the Easington Landfall including Spurn Head National Nature Reserve (NNR), Humber Estuary SAC, SPA, Ramsar and SSSI).
- Coastal waterbodies (increased suspended sediment, erosion and deposition) (water quality to be assessed within Chapter 18: Hydrology and Land Drainage and further, within the Water Framework Directive (WFD) assessment).

20.5.2 Baseline data to characterise the coastal processes within the Study Area has been collected from a desk study, with reference to published data sources, supplemented by data sets collected in consultation (e.g., the EA and Lead Local Flood Authority (LLFAs)).

Designated Sites

20.5.3 Several designated coastal sites are located near Easington Landfall. The search radius was determined using indicative tidal excursion ellipses from the Atlas of UK Marine Renewable Energy Resources (Ref 20.20). This study outlines the sediment transport regime within a tidal cycle, identifying a tidal excursion of approximately 15 km north of the Humber around the Landfall. This distance was used to define the designated sites deemed of potential relevance to coastal processes; this was determined due to the potential of impacts to the coastal process's receptor impeding the quality of such sites (Table 20-9).

20.5.4 A full assessment of the noted designated sites has been provided within Chapter 7: Ecology and Biodiversity and Chapter 10: Ground Conditions and Hydrogeology for the relevant receptors. They will further be assessed as part of the Habitats Regulations Assessment (HRA).

Table 20-9 – Coastal Sites within 15 km of the Pipeline

Site Name	Description	Distance / Direction from Study Area
Dimlington Cliffs SSSI	The Dimlington Cliffs SSSI intersects the Project's draft Order Limits at the Easington Landfall and is designated for its geological significance. The cliffs provide valuable insights into geology, particularly regarding glacial and interglacial periods.	Within the draft Order Limits
Greater Wash SPA	The Greater Wash SPA intersects the Project's draft Order Limits at the Easington Landfall. It is recognised for its marine and ornithological significance, providing essential habitats for various seabird species during breeding and non-breeding seasons.	Within the draft Order Limits
Humber Estuary SPA	The Humber Estuary SPA is recognised for supporting internationally important numbers of various species of breeding and wintering birds.	3 km south-southeast
Humber Estuary SAC	The Humber Estuary SAC is a muddy, macro-tidal estuary fed by several rivers, including the Ouse, Trent, and Hull. It is recognised for its estuarine habitats, which support a diverse range of species and ecological communities.	3 km south-southeast
Humber Estuary Ramsar	The Humber Estuary Ramsar Site features a tidal range exposing vast mud and sand flats at low tide, with vegetation including extensive reedbeds and areas of mature and developing saltmarsh. The site supports a significant number of waterfowl, making it an internationally important wetland.	3 km south-southeast
The Lagoons	The Lagoons SSSI encompasses coastal habitats, including saltmarsh, shingle, sand dune, swamp, and saline lagoons, which support diverse plant and animal communities.	3 km south-southeast

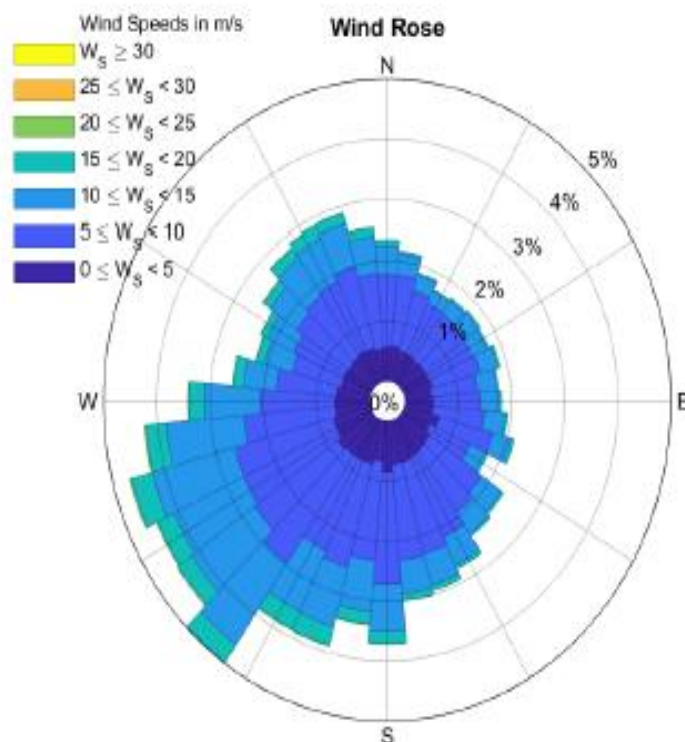
Site Name	Description	Distance / Direction from Study Area
Humber Estuary SSSI	The Humber Estuary SSSI is a nationally important site featuring estuarine habitats such as intertidal mudflats, sandflats, coastal saltmarsh, saline lagoons, sand dunes, and standing waters.	4 km south-southwest

Physical Environment

Metoccean Conditions

Wind

- 20.5.5 The UK's east coast, at the Easington Landfall, is relatively sheltered compared to the Atlantic west. A preliminary assessment of metoccean conditions evaluated wind data for coastal and offshore waters (CS001 Phase 1 Storage Permit: 6_Corrective_Measures_Plan (Ref 20.31)). Wind speeds vary seasonally, with higher averages in winter and the maximum recorded annual wind speed is 25 m/s. Coastal wind speeds range from 5 to 8 m/s in winter, decreasing to 4 to 5 m/s in summer (UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3) (Ref 20.32)).
- 20.5.6 Offshore, prevailing winds originate from the south and northwest. Average summer wind speeds range from 1 to 11 m/s, while winter sees an increase in frequency of high-wind events. In January, winds exceed 14 m/s approximately 20% of the time, compared to 2–4% in July (Insert 20-1) (Ref 20.32).



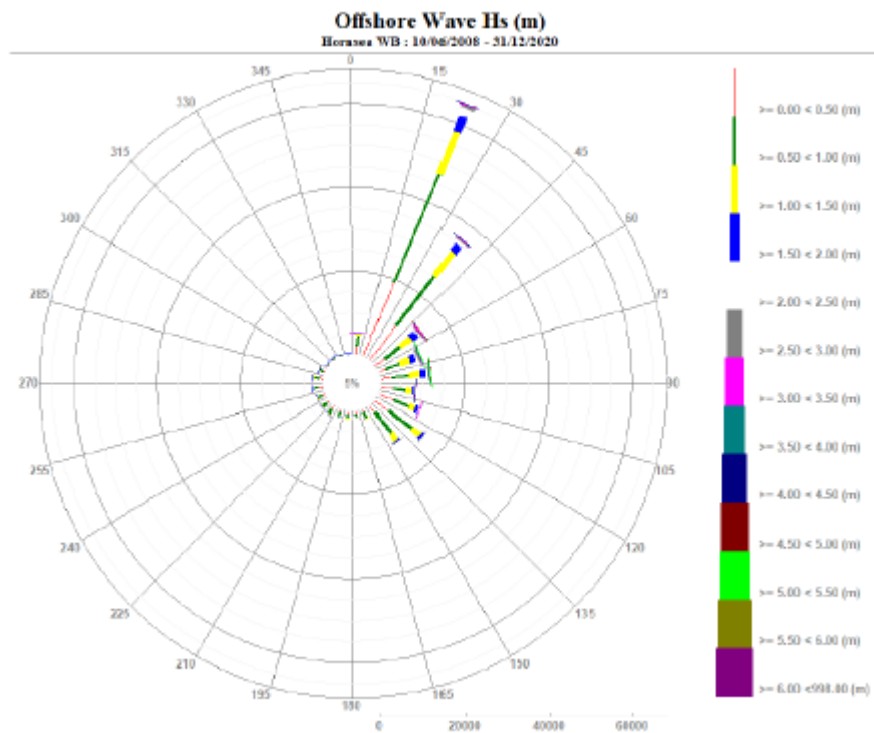
Insert 20-1 – Wind Conditions for Coastal and Offshore Waters in Proximity to Easington Landfall

Wave

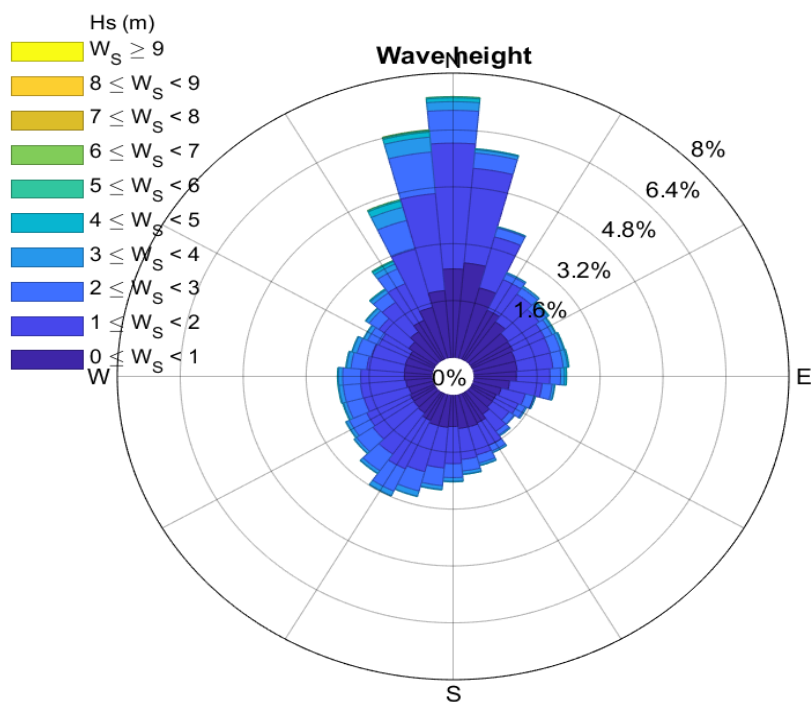
- 20.5.7 Wave conditions in the vicinity of the Easington have been assessed using data from the Hornsea wave buoy, located 5 km off Hornsea and 10 km from the closest point of the proposed Humber leg of the offshore pipeline route (NEP project), alongside other relevant studies. The Hornsea wave buoy represents the closest direct data on the wave regime to inform the Project. Average wave heights remain below 2 m, though episodic storm events occasionally generate waves exceeding 4 m (Ref 20.33). Data from 2008 to 2016 indicate dominant wave directions from the north-northeast, followed by the northeast. In all months except July, the secondary direction is east-northeast (Ref 20.34) (see Table 20-10, Insert 20-2, and Insert 20-3).

Table 20-10 – Monthly Average Wave Properties (June 2008-December 2020; (Ref 20.35))

Month	Significant wave height (Hs (m))	Peak wave period (Tp (s))	Direction (°)
January	0.99	8.3	77
February	0.99	8.0	77
March	0.88	8.5	70
April	0.81	7.6	66
May	0.75	6.7	75
June	0.66	6.4	71
July	0.58	5.9	83
August	0.58	5.8	92
September	0.70	6.7	84
October	0.95	7.6	79
November	1.02	7.7	77
December	0.96	8.5	73



Insert 20-2 – Wave rose for the Hornsea Wave Buoy (Ref 20.35)



Insert 20-3 – Mean Significant Wave Height and Direction Offshore (at Endurance Store area) (20.33)

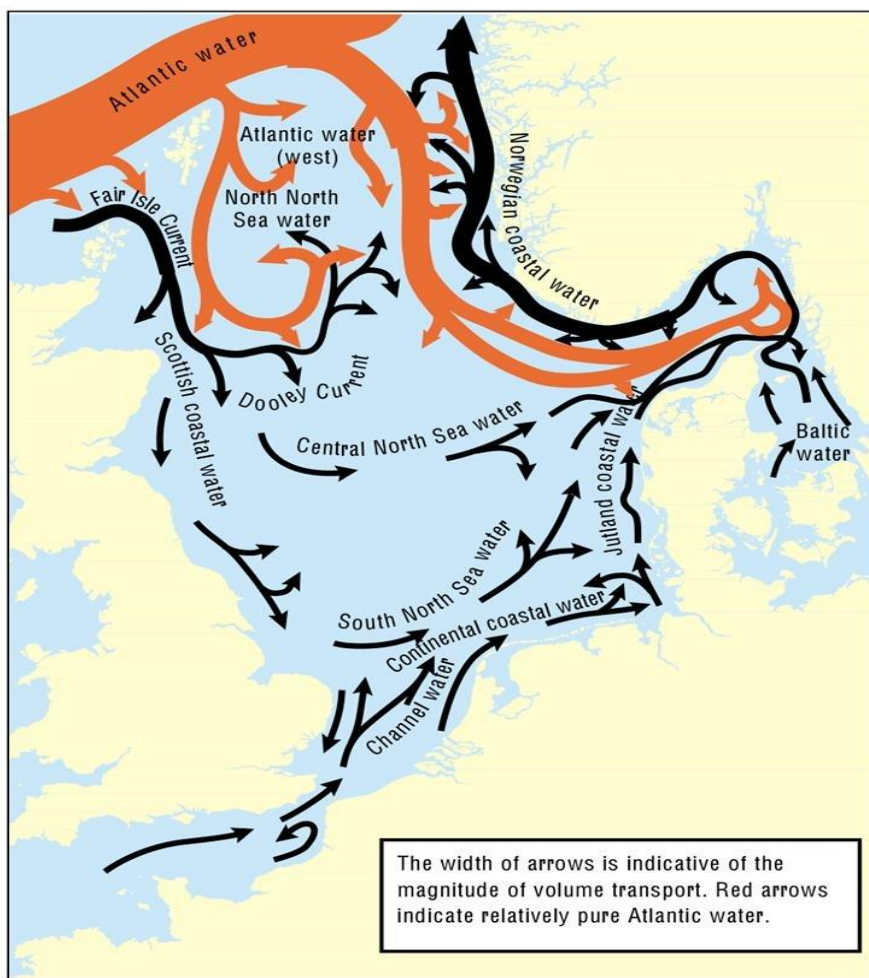
Oceanographic and Hydrodynamic Conditions

General Oceanographic Conditions

- 20.5.8 The southern North Sea is a dynamic, shallow marine environment with significant seasonal temperature variation. Freshwater inputs from the coast reduce salinity and introduce nutrients, supporting high biological productivity, influencing both benthic and pelagic ecosystems. (Ref 20.36, Ref 20.37).

Circulation Patterns

- 20.5.9 Circulation follows an anti-clockwise pattern. Atlantic water inflows from the north, flowing southward along the UK's east coast, with additional inflows from the English Channel further contributing to current dynamics. Outflow primarily occurs northward along the Norwegian coast (Ref 20.37, Ref 20.38) (Insert 20-4). At Easington and the mouth of the Humber, high net sediment transport flows predominately south near the coastline (Ref 20.20).



Insert 20-4 – Schematic Diagram of General Water Circulation Patterns of the North Sea (Ref 20.38)

Tidal Regime

- 20.5.10 The tidal flux along the Holderness coast is characterised by a southward flood tide and a northward ebb tide. Data collected at Bridlington, located south of Flamborough and Spurn Head, concluded mean spring tidal ranges of 5.0 m and 5.7 m respectively, while mean neap tidal ranges were noted as 2.4 m and 2.8 m (Ref 20.21). At the shore, within 1 km of Easington Landfall, the spring tidal range is approximately 5.27 m, generating tidal power of 0.89 kW/m². The neap tidal range in this region is approximately 2.34 m (Ref 20.39). The tidal power is notably strong within the transitional waters to the Humber Estuary, peaking off the coast of Spurn Head, south of Easington Landfall.
- 20.5.11 The Humber estuary is macro-tidal, with semi-diurnal tides ranging from 3.5 to 7 m (Ref 20.39, Ref 20.30). Mean High Water Springs (MHWS) level at Goole,

located upstream of the estuary, are 1.3 m above those at the estuary mouth near Spurn Head, increasing further inland due to the narrowing channel. Strong tidal currents exceed 1.0 m/s, particularly at the estuary mouth, influencing sediment transport and deposition. Tidal asymmetry results in a stronger ebb flow, accelerating sediment export and channel deepening (Ref 20.40).

- 20.5.12 Water levels along the east coast are influenced by tidal surges driven by low atmospheric pressure systems moving southward through the North Sea. These surges can temporarily elevate water levels, impacting coastal hydrodynamics. Predicted extreme water levels for Easington vary based on return periods (Table 20-11).

Table 20-11 – Extreme Waters Levels and their associated return Period (Ref 20.41)

Return Period (years)	Water Level (m ODN)
1 in 1	3.63
1 in 5	3.87
1 in 50	4.23
1 in 100	4.33

- 20.5.13 Offshore, near the Holderness coast, mean spring near-surface tidal currents range from 0.75 to 1.25 m/s, with near-bottom velocities slightly lower due to the relatively shallow water depths (Ref 20.42). The maximum flood flow velocity is equal to or greater than the ebb flow and lasts longer, causing net southward sediment transport (Ref 20.43), thus influencing the movement of material south.

Storm Events and Surges

- 20.5.14 Seasonal and episodic storm surges contribute to tidal variability, temporarily raising water levels and intensifying intertidal erosion. Storm events increase sediment transport as wave energy and tidal forces mobilise sand and fine sediments, altering substrate stability. Increased turbidity from suspended sediments reduces light penetration, affecting water quality and habitat conditions (Ref 20.30). These processes directly influence the Holderness coastline, where storm surges can rapidly alter the beach profile and exacerbate cliff recession, influencing sediment supply to downdrift areas such as Spurn Head.

Wave-Driven Processes and Energy Regime

- 20.5.15 Tidal and wave-driven forces shape the hydrodynamic regime along the east coast. Seabed kinetic energy varies spatially, with moderate peak kinetic energy in much of the southern North Sea, increasing in coastal areas due to wave action. These energy levels influence sediment transport, seabed morphology, and habitat distribution (Ref 20.44). Persistent wave exposure and episodic high-energy events at the landfall on the Holderness coast, are a primary driver of sediment movement and coastal erosion, directly affecting the stability of the intertidal zone and nearby designated habitats.

Sediment Dynamics & Coastal Morphology

Phase 1 Walkover Survey

- 20.5.16 The intertidal zone of the Project is bordered by cliffs that are subject to significant erosion. The extent of the survey area comprised a rippled sandy beach, with a clay platform located in the mid to lower shore, with medium sand overlaying shingle in places. The beach showed a greater proportion of shingle, forming a steeper beach gradient in the area immediately north of the Easington Terminal Sea defences. Patches of pebbles were also present near the strandline and adjacent to the existing sea defences. Some cliff deposits were identified within the sediments of the intertidal area. The strandline areas were dominated by hornwrack (*Flustra foliacea*) and boulders (Ref 20.45).
- 20.5.17 During the 2025 shoreline walkover survey, similar results were concluded. The survey did however observe a difference in cliff extent and notable cliff retreat since the previous 2022 survey. Cliff retreat was noted qualitatively and the observational evidence of this is illustrated in Insert 20-5 and Insert 20-6. A summary of key findings from the 2022 survey, alongside preliminary results from the 2025 Phase 1 and Phase 2 surveys, is presented within this PEIR to illustrate baseline trends. The ES will provide the full results of the 2025 surveys, including laboratory analyses (e.g. infaunal identification and enumeration) and comparative assessments against the 2022 surveys and other relevant datasets.



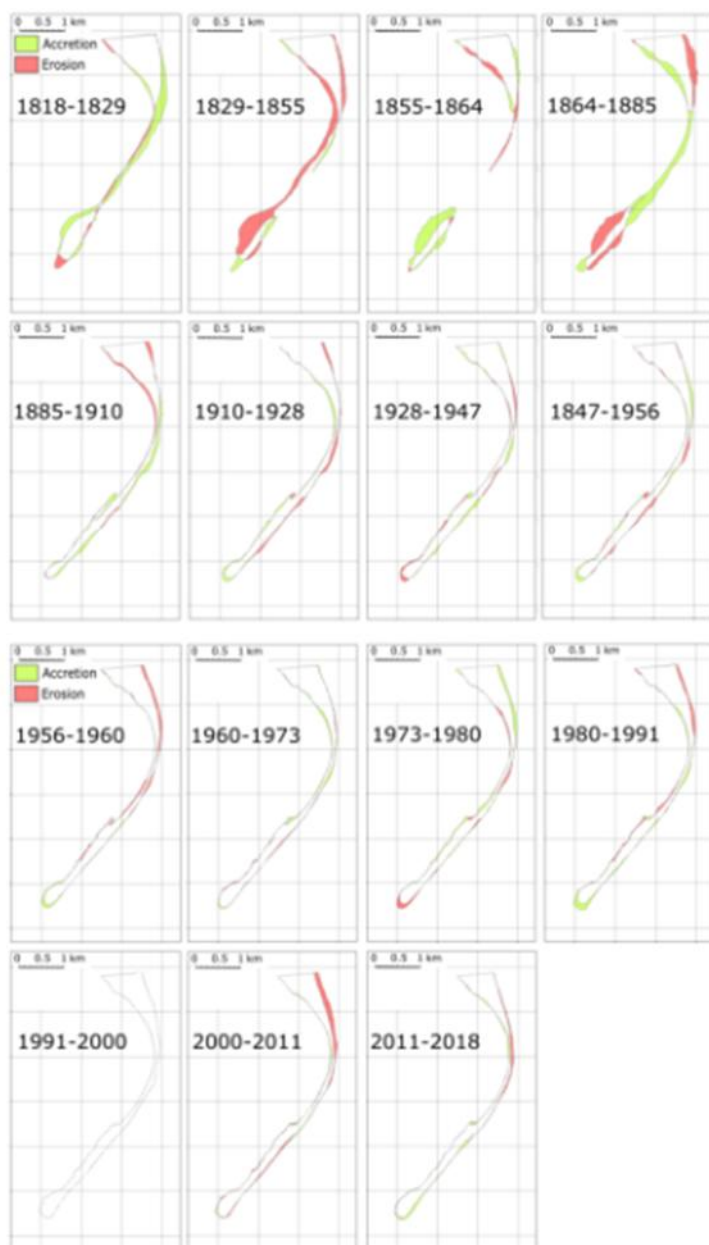
Insert 20-5 – Evidence of Recent Cliff retreat at Easington Landfall



Insert 20-6 – Example of the Shoreline at Easington Landfall with Bordering cliff

Sediment Transport, Erosion and Accretion Patterns

- 20.5.18 The Holderness coastline is rapidly eroding, at times exceeding 3 m annually (Ref 20.40, Cliff Erosion Monitoring Cliff Erosion Data Table (Ref 20.46)). This erosion is driven by North Sea wave and tidal action on its soft glacial till (Ref 20.30), intensified by winter storms that enhance sediment mobilisation. These processes actively shape the coastline and are key components to maintaining the area's geologically significant features, such as Dimlington Cliff SSSI, which is located at Easington Landfall.
- 20.5.19 To the south, Spurn Head, a dynamic spit at the Humber Estuary mouth, is sustained by southward sediment transport from the regional cliff erosion (Insert 20-7). The influence of both marine and estuarine dynamics, along with seasonal and storm-driven sediment redistribution, play a critical role in shaping its evolving morphology. Approximately 1,000,000 m³ of sediment is released annually through cliff erosion, with an additional 2,000,000 m³ derived from intertidal foreshore erosion. Sediment composition includes 79% clays, 12.5% fine sands, 7.5% sands and shingle, and 1% cobbles and boulders (Ref 20.47).

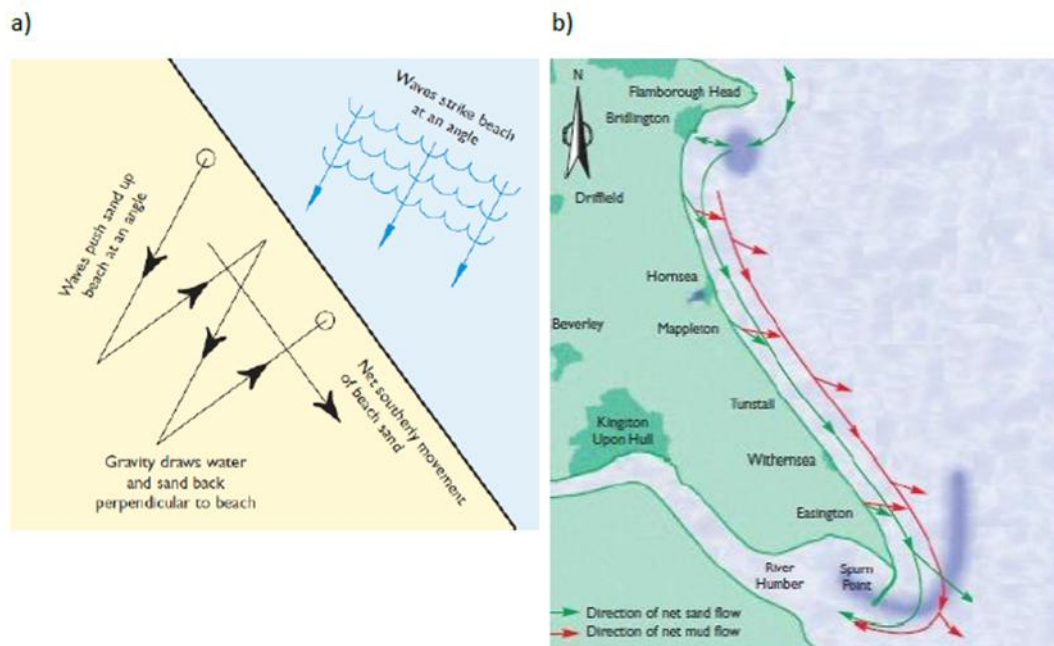


Insert 20-7 – Areas of Accretion and Erosion of Spurn Head from 1818 to 2018 (Ref 20.48)

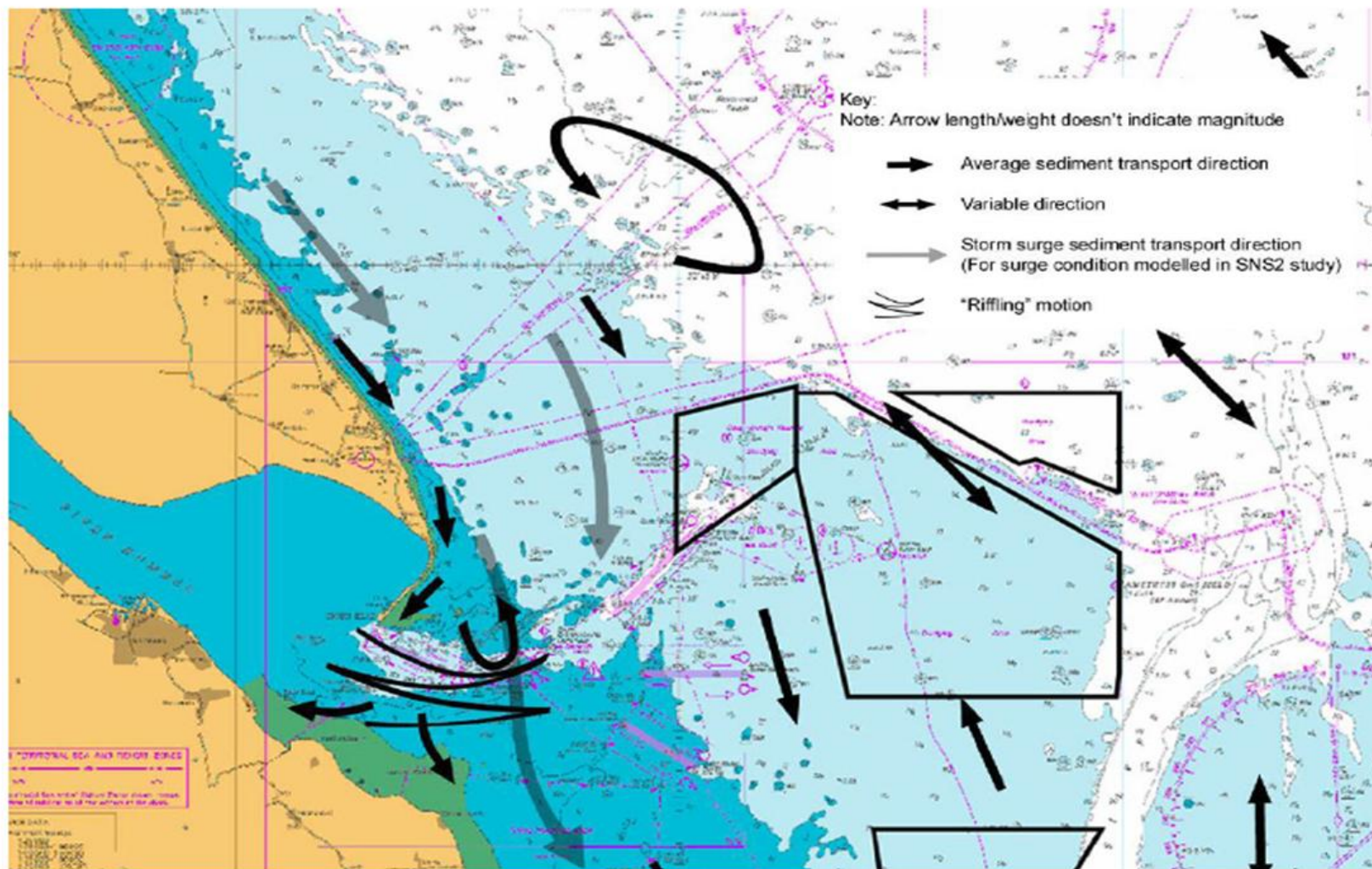
- 20.5.20 Numerical modelling and field studies estimate longshore sediment transport rates along Holderness at 200,000–350,000 m³/year, with transport most intense within 2 km of the shore, peaking during storms (Ref 20.21; Ref 20.30). Seasonal and episodic events, such as storm surges and spring tides, further influence transient features such as sandbanks and mudflats (Ref 20.39).
- 20.5.21 At Easington Landfall, sediment transport is driven by tidal currents, wave energy, and surface water inputs. Potential net sand transport rates are highest at Spurn Head and toward the middle of the Estuary. Transport rates are lower toward the Estuary mouth and upriver (Ref 20.20). Coarser sands accumulate

near the high-water mark, while finer silts and clays settle offshore, where hydrodynamic forces are less influencing (Ref 20.30). Localised accretion occurs in areas of reduced flow velocity, though deposits are often temporary and subject to resuspension during high-energy events (Ref 20.39).

20.5.22 Sediment transport with respect to the Project of relevance to the coastal processes Study Area is highlighted in Insert 20-8 and Insert 20-9.



Insert 20-8 – Sediment Transport in relation to the Project A) Indicates Dominant Northeasterly Wave Direction, Leading to Net Southerly Movement of Beach Sand. B) Indicates Dominant Offshore Transport of Eroded Clay Cliffs, Bed Strata and Sand in Suspension (Ref 20.47)



Insert 20-9 – Schematic of Sediment Transport Pathways for South Holderness, the Entrance to the Humber and North Lincolnshire (Ref 20.21)

Shoreline Management

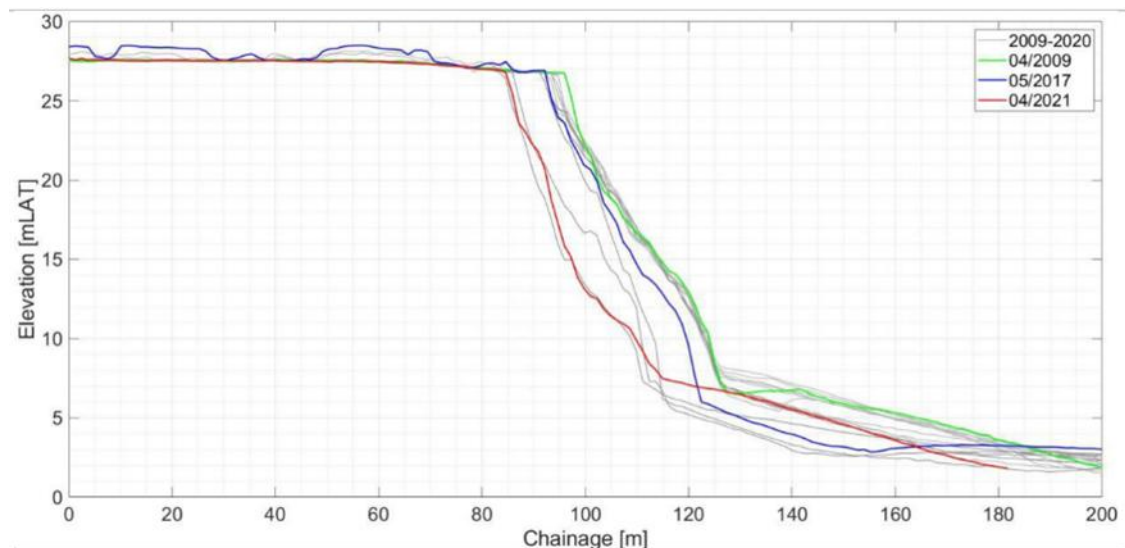
- 20.5.23 The Easington Landfall is within Coastal Cell 2, governed by the SMP for this sector (Ref 20.13). The coastline is divided into five geomorphological units:
- Chalk Cliffs (Flamborough Head to Sewerby).
 - Holderness Cliffs (Sewerby to Kilnsea).
 - Spurn Head.
 - Outer Humber.
 - Lincolnshire Coast (Donna Nook to Gibraltar Point).
- 20.5.24 SMP policies vary by geomorphological conditions and land use priorities:
- Hold the Line (HTL): Applied to defended areas such as Easington, where infrastructure protection measures are in place.
 - No Active Intervention (NAI): Adopted along much of the Holderness coast, permitting natural erosion processes.
 - Managed Realignment (MR): Implemented at Spurn Head to accommodate natural coastal evolution, transitioning to a combination of MR and NAI in the medium to long term.
- 20.5.25 These policies balance coastal management with the region's dynamic sedimentary and morphological processes.

Coastline and Projections

- 20.5.26 The Holderness coast is one of Europe's most rapidly eroding shorelines, with an average recession rate of 1.7 m/year (Ref 20.46, Insert 20-10). The weakly consolidated boulder clay cliffs are highly susceptible to erosion from persistent wave and tidal action. This material is transported southward, supplying Spurn Head and the Humber Estuary (Ref 20.47). Easington Landfall is classed as highly susceptible to erosion (Class E), with cliff recession rates averaging 1.52 m/year from 1989 to 2021 (Ref 20.46, Ref 20.47).
- 20.5.27 Coastal projections for the coastline are presented within Table 20-12, with beach profile elevation outlined in Insert 20-10.

Table 20-12 – Coastal Erosion Projections for the Holderness Coast (Ref 20.46)

Profile no.	Location	Cliff top elevation	Average cliff recession rate 1852-1989 (m/yr)	Average cliff recession rate 1989- April 2021 (m/yr)
106	South of Out Newton	23.4	1.62	0.81
107	Dimlington High	35.4	1.69	0.79
108	South of Dimlington High	27.7	1.63	1.41
109	Between Dimlington High and Easington	23.0	1.50	1.52
110	North end of gas terminal site, Easington	18.3	1.67	Defended
111	Centre of gas terminal site, Easington	12.2	1.77	Defended
112	South end of gas terminal site, Easington	12.4	1.75	Defended



Insert 20-10 – Beach profile 109 extracted from LiDAR data sourced from ERoY and CCO (Ref 20.49)

- 20.5.28 Coastal erosion monitoring by ERoY includes data from 123 cross-shore profiles since 1852, using Ordnance Survey maps, Global Positioning Systems (GPS) surveys, and LiDAR. Profile 109, closest to Easington Landfall, indicates episodic cliff failure due to alternating wetting and drying cycles, leading to rotational slips and slides (Ref 20.49). These failures can result in retreat events exceeding 10 m. South of Easington Landfall, Spurn Head acts as a sediment sink providing protection for the Humber Estuary. Only 3–6% of Holderness' eroded material reaches Spurn Head, with most sediment lost offshore or deposited within the estuary (Ref 20.50).
- 20.5.29 ERoY have provided updated erosion data, during consultation in 2025, indicating a revised average cliff recession rate of 1.74 m/year at Erosion Profile 109 (500 m section of the Holderness Coast that encompasses the proposed Easington Landfall). To account for future retreat and maintain an adequate buffer throughout the operational lifespan of the Project the current proposed footprint for the pumping station is located in excess of 170 m from the current cliff line.
- 20.5.30 A supporting study undertaken in 2022 (Ref 20.49) used an increased erosion rate of 3.05 m/year across the whole Holderness Coast, based on calculating the average just the most recent decade of cliff surveys (2011 to 2021), as there has been an apparent recent acceleration in erosion. Assuming this highly precautionary recession rate of 3.05 m/year and updated rates from ERoY, 1.74 m/year, total recession rates over years can be calculated as shown below.

Based on these sets of projections in the two studies above, projected cliff erosion over longer time periods is estimated to be as per the below:

20.5.31 Rates of erosion at 1.74 m/year:

- 43.5 m after 25 years.
- 52.2 m after 30 years.
- 69.6 m after 40 years.
- 87 m after 50 years.

20.5.32 Rates of erosion at 3.05 m/year

- 76.25 after 25 years.
- 91.5 m after 30 years.
- 122 m after 40 years.
- 152 m after 50 years.

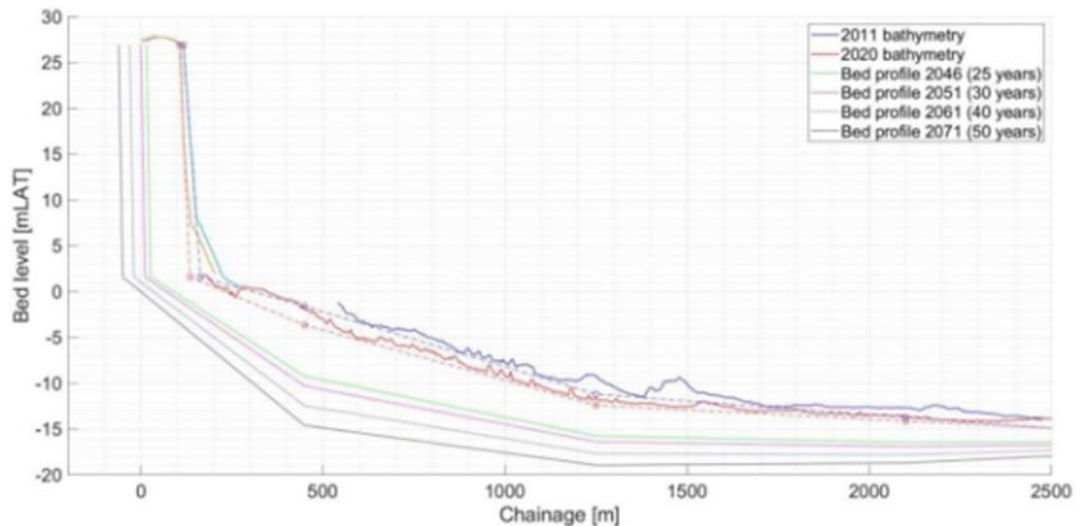
20.5.33 Projected shore platform lowering (Ref 20.49), excluding climate change effects, is estimated as follows:

- 0.8–1.5 m after 25 years.
- 1.0–1.8 m after 30 years.
- 1.3–2.4 m after 40 years.
- 1.7–3.3 m after 50 years.

20.5.34 A summary of projected cliff recession and clay bed lowering is presented in Table 20-13 and Insert 20-11.

Table 20-13 – Clay Bed Lowering using Cliff and Slope Erosion Rates (Ref 20.49)

Feature	Rate	Total Recession (m)				Projected Height (mLAT)			
		25 y	30 y	40 y	50 y	25 y	30 y	40 y	50 y
Cliff	3.05	79.4	95	125	156	55.6	40.4	9.8	-20.7
Upper beach toe	0.21	5.6	6.7	8.8	11	-9.2	-10.3	-12.5	-14.6
Lower beach toe	0.13	3.3	4	5.3	6.5	-15.7	-16.4	-17.7	-19
Nearshore	0.04	1.2	1.4	1.8	2.3	-15.3	-15.5	-16	-16.4



Insert 20-11 – Future Projections of the Representative Clay Bed Profile Lowering (Ref 20.49)

- 20.5.35 Sediment samples were collected in 2022 from nine primary stations and additional transects for analysis of particle size, Total Organic Content (TOC), hydrocarbons, and heavy / trace metals. The sediment across the survey area primarily consisted of sand, with gravel content increasing at mid and lower shore levels. The upper shore had medium sand, mid-shore had sandy gravel or gravelly sand, and lower shore transitioned from fine sand in the south to very coarse sand in the north. TOC levels were low (0.08% to 0.25%), with higher levels generally found at the lower shore, reflecting the greater proportion of fine sediments. Metal traces, including aluminium, arsenic, cadmium, and others, were analysed via various digestion methods followed by Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) or Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Polycyclic Aromatic Hydrocarbons (PAHs) and Total Petroleum Hydrocarbons (TPHs) were also analysed through solvent extraction and chromatography techniques. The results align with field observations indicating sand dominance at upper shores and increasing gravel content towards the north, where coarser sediments are more prevalent (Ref 20.45). Updated survey findings based on the April 2025 survey campaign will be presented in the ES.
- 20.5.36 Preliminary results are further contained within Chapter 10: Ground Conditions and Hydrogeology, Chapter 7: Ecology and Biodiversity, and Appendix 7.3 Intertidal and Marine Technical Appendix.

Future Baseline

- 20.5.37 The future baseline represents known or anticipated changes to conditions considered likely in the absence of the Project which should be assessed as part of the EIA.
- 20.5.38 To establish the future baseline, the existing baseline at the time of survey is considered along with likely changes before the construction and operation phases of the Project. Likely changes may include the continuation of current trends in baseline conditions, development phases of other planned or consented developments within the area and likely effects of climate change.
- 20.5.39 Additionally, the following may be considered in terms of future baseline:
- **Climate change (i.e., higher energy wave regime , storm surges)** may lead to greater southward sediment transport and deposition at Spurn Head, potentially reshaping the intertidal areas and influencing sediment accumulation around the Humber estuary mouth. Consultation with EROy in 2025 identified updated cliff erosion rates of 1.74 m/year and a maintain minimum distance of 14.22 m from the cliff edge throughout the design life of the Project, reflecting recent monitoring data in line evidencing the rapidly eroding coastline. The EROy Local Plan (Ref 20.9) and the Flamborough Head to Gibraltar Point Shoreline Management Plan (Ref 20.13) further recognise the Holderness frontage as highly susceptible to climate-driven erosion and Project continued cliff recession under increased storm surge and wave energy scenarios.
 - **Human interventions (i.e. dredging):** may disrupt natural sediment transport dynamics, which could exacerbate sediment displacement and alter the deposition patterns, leading to potential accretion or material loss in certain intertidal areas. The East Inshore and East Offshore Marine Plans (Ref 20.12) identify the need to consider dredging impacts on sediment pathways and seabed morphology in project planning.
 - **Future coastal defences or land reclamation projects:** may limit sediment exchange, causing localised erosion or shifts in sediment supply, leading to destabilisation of cliff areas and intertidal substrates as natural sediment inputs become restricted, particularly affecting the unconsolidated boulder clay and sand deposits characteristic of this coastline. The Humber Flood Risk Management Strategy (Ref 20.14) and Humber 2100+ Sustainability Appraisal (Ref 20.15) set out long-term flood and erosion management approaches which could influence sediment availability to this section of the coast.

- **Urban and industrial development:** may increase stormwater runoff, which can alter sediment loads, degrade water quality, and enhance erosion within the estuary, leading to intensified shoreline modification, further reducing the natural buffering capacity of the intertidal zone against wave action. This, combined with anticipated sea-level rise, could lead to accelerated coastline retreat near Easington. The North East Lincolnshire Local Plan (2018) and East Riding Local Plan (2016) emphasise the need to integrate flood resilience and sediment management into development proposals to mitigate such effects (Ref 20.9, 20.10).

20.6 Design Development, Impact Avoidance and Embedded Mitigation

Design Development and Impact Avoidance

- 20.6.1 Where practicable the Project has been designed to minimise impact to the Coastal Processes receptor, alongside those receptors that are intrinsically linked to such processes (i.e. ecological and geological features).
- 20.6.2 The main measure in relation to preventing adverse impacts to the receptor is the implementation of trenchless techniques and sufficient burial of the pipeline. The HDD will be commenced a sufficient distance back from the cliff edge and aligned such that it will traverse under the cliff as so to avoid interaction with the cliff face. This is to ensure coastal erosion and lowering of the beach profile is not accelerated consequent of Project construction, operation and decommissioning.
- 20.6.3 The Project will further ensure accordance with all best practice procedures across all Project phases. Adherence to a dedicated Project Construction Environment Management Plan (CEMP) will be a Project commitment, with an outline CEMP submitted alongside the DCO application. The CEMP will subsequently be secured through a requirement in the DCO and Commitments Register. A Decommissioning Environmental Management Plan (DEMP) will further be prepared. Both plans will aim to address exposure risks, sufficient burial depths, reinstatement plans, operational monitoring and best practice procedures in order to mitigate risks to the Coastal Processes receptor.

Embedded Mitigation

- 20.6.4 Embedded mitigation measures deemed to be of relevance to the Coastal Processes topic are included within Table 20-14.

Table 20-14 – Embedded Mitigation

Ref	Measure	Project phase	Responsible party
CP1	Pump Facility will be set back at an appropriate distance from the cliff such that there is no risk in the context of cliff retreat over the lifetime of the Project	Design	Designer
CP2	Pipeline to be adequately buried below the predicted cliff line and seabed profile throughout its design life (25 years)	Design	Designer
CP3	Pipeline to be installed beneath Dimlington Cliffs utilising trenchless methods	Construction	Contractor
CP4	Where practicable, vibratory piling to be used over impact piling for the installation of the cofferdam (if required).	Construction	Contractor
CP5	Following pipeline installation, it will be buried using excavated material and the beach will be reinstated to pre-construction condition	Construction	Contractor
CP6	Material excavated for construction of the temporary access track through Dimlington Road will be stored, and subsequently reinstated following completion of Project construction	Construction	Contractor
CP7	Design, construction, operations, and decommissioning of the pipeline will be in accordance with best practice guidance	Design, Construction Operation Decommissioning	Contractor
CP8	CEMP will be prepared prior to construction of the Project	Construction	Applicant

Ref	Measure	Project phase	Responsible party
CP9	DEMP will be implemented during the decommissioning phase, this will outline health and safety risks with regard to pipeline exposure etc.	Decommissioning	Applicant
CP10	The cofferdam, if used, and other associated infrastructure will be present for as short a time as reasonably practicable during construction.	Construction	Contractor
CP11	Any significant accumulation of beach sediments due to physical presence of the cofferdam will be mechanically removed to ensure nature sediment transport processes continue.	Construction	Contractor
CP12	Pipeline route optimisation in the nearshore will be conducted where reasonably practicable to minimise impacts on potential features of conservation interest.	Design	Designer
CP13	Regular maintenance checks.	Operation Decommissioning	Applicant

20.7 Preliminary Assessment of Potential Impacts

Construction

- 20.7.1 The potential impacts for Coastal Processes associated with the construction phase are provided in Table 20-15.
- 20.7.2 Whilst this chapter covers the potential for impacts on coastal processes at the Easington Landfall and Humber and tidal River Trent estuary crossings, it is acknowledged that due to the trenchless construction techniques for the pipeline at the estuary crossings with no direct interactions with the intertidal and marine environment that no impacts on coastal processes are envisaged.

Table 20-15 – Construction Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
Impedance to longshore sediment transport from the installation and presence of a temporary cofferdam, associated with micro-tunnelling (including to Spurn Head NNR, Humber Estuary SAC, SPA, Ramsar and SSSI)	Negligible	Temporary interruption of sediment transport pathways, potentially reducing sediment supply to designated sites	Low	Short-term	Adverse	Direct
Disturbance of Dimlington Cliff SSSI and associated increased erosion consequent of beach works	Medium	Potential for localised cliff erosion due to altered hydrodynamics and wave energy	Low	Short-term	Adverse	Direct
Local scour due to presence of vessels and jack-up barge	Negligible	Localised seabed erosion and sediment resuspension near temporary structures	Low	Short-term	Adverse	Direct
Increases in suspended sediment concentrations and deposition of disturbed sediments during pipeline installation	Negligible	Temporary increase in turbidity and localised sediment deposition	Low	Short-term	Adverse	Direct

- 20.7.3 The potential impacts for Coastal Processes associated with the operational phase are provided in Table 20-16.
- 20.7.4 It has been assumed for the purposes of the PEIR that the pipeline will be buried to a sufficient depth as noted in Section 20.6, such that no impacts in relation to exposure are expected.

Table 20-16 – Operational Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
No likely significant impacts to coastal processes identified						

Decommissioning

- 20.7.5 The potential impacts for Coastal Processes associated with the decommissioning phase are provided in Table 20-17.
- 20.7.6 Due to the assumption of sufficient pipeline burial, a robust DEMP, and maintenance monitoring, it has been assumed that the potential for pipeline exposure associated with decommissioning is unlikely. Hence impacts to the Coastal Processes receptor is deemed to be negligible.

Table 20-17 – Decommissioning Phase – Preliminary Assessment of Potential Impacts

Resource / Receptor	Sensitivity of resource / receptor	Description of potential impact / change	Magnitude of impact / change	Duration of impact	Adverse / beneficial	Direct / indirect
No likely significant impacts to coastal processes identified						

20.8 Additional Mitigation and Enhancement Measures

- 20.8.1 This Section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the potential impacts as assessed in Section 20.7.

Construction

- 20.8.2 Prior to the commencement of works, agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal, to assess whether sensitive sites have been returned to their pre-installation state.
- 20.8.3 A Beach Monitoring and Management Plan will also be agreed with the Local Authority and relevant consultees, as required. This Plan would detail the reinstatement of the beach to pre-construction condition, as far as reasonably practicable.
- 20.8.4 During and in the years following construction, there will be ongoing monitoring of cliff recession and coastal erosion rates to assess the impact construction of the Project may have had on such features.

Operation

- 20.8.5 Over the course of the lifetime of the Project there will be continual monitoring of the pipeline at Easington Landfall to ensure it does not become exposed as a result of erosion. However, it is important to note that the design of the pipeline was developed to ensure sufficient burial depth.

Decommissioning

- 20.8.6 As the pipeline will remain in-situ post operation, no impacts are foreseen at the Easington Landfall, such that no additional mitigation measures are required.

20.9 Summary of the Preliminary Assessment of Potential Significant Effects

- 20.9.1 Table 20-18 below summarises the preliminary assessment of potential significant effects associated with the Project.
- 20.9.2 Please refer to Section 20.6 for embedded measures that have been considered as part of the preliminary assessment.

Table 20-18 – Summary of the Preliminary Assessment of Potential Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Impedance to longshore sediment transport from the installation and presence of a temporary cofferdam, associated with micro-tunnelling (including to Spurn Head NNR, Humber Estuary SAC, SPA, Ramsar and SSSI)	Medium	Construction	Temporary interruption of sediment transport pathways, potentially reducing sediment supply to designated sites	Short-term	A Beach Monitoring and Management Plan of erosion rates, cliff retreat and beach profile. Agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal	Minor
Disturbance of Dimlington Cliff SSSI and associated disruption to natural erosion consequent of beach works	Medium	Construction	Potential for localised cliff erosion due to altered hydrodynamics and wave energy and changes in rates of erosion during construction and following reinstatement	Short-medium term	Beach monitoring and management plan of erosion rates, cliff retreat and beach profile Ongoing monitoring of cliff retreat and coastal erosion rates following construction Agreement on the requirements in the nearshore at Easington will be reached with consultees including the Shoreline Management team at EROy for any post-installation surveys in the intertidal	Moderate
Local scour due to presence of vessels and jack-up barge	Very low	Construction	Localised seabed erosion and sediment resuspension near temporary structures	Short-term	Agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal	Neutral
Increases in suspended sediment concentrations and deposition of disturbed sediments during pipeline installation	Very low	Construction	Temporary increase in turbidity and localised sediment deposition	Short-term	NA	Neutral

20.10 Next Steps

Design Development

- 20.10.1 The design of the Project, alongside both the embedded and additional mitigation presented within this chapter are deemed sufficient to minimise any significant impacts. The design will be assessed and discussed to minimise impacts on the Coastal Processes receptor.

Engagement

- 20.10.2 Engagement with the relevant consultees (i.e., the MMO, Natural England, EROy and the EA) will continue into ES. Any additional consultation undertaken will be included at ES.

Surveys

- 20.10.3 Intertidal Phase 1 and Phase 2 walkovers survey were undertaken in April 2025. No further surveys are anticipated to support the Coastal Processes chapter.

Further Assessment

- 20.10.4 No further assessments are proposed for Coastal Processes, aside from the interpretation and analysis of intertidal survey results, and further assessment and evaluation of updated data from EROy and the Offshore Environmental Statement which will be contained within the ES.

20.11 References

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21 Cumulative Effects

21.1 Introduction

- 21.1.1 This chapter presents the preliminary findings of the Cumulative Effects assessment undertaken as part of the Environmental Impact Assessment (EIA) process to date.
- 21.1.2 The purpose of the Cumulative Effects assessment is to assess whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects alone. Such effects may arise from the construction / commissioning, operation, maintenance and decommissioning of the Project.
- 21.1.3 The Cumulative Effects assessment has considered the following types of Cumulative Effects:
- Intra-project effects – the interaction and combination of different residual (post-mitigation) environmental effects of the Project affecting the same Receptor. For example, visual and noise effects during construction affecting the same residential dwelling.
 - Inter-project effects – the residual (post-mitigation) environmental effects of the Project combining and interacting with the residual environmental effects of other 'Committed Developments', including consideration of other parts of the Project, affecting the same Receptor.
- 21.1.4 The assessment has been qualitative and based on environmental information available at the time of assessment.
- 21.1.5 This chapter describes the methodology used, the datasets and baseline conditions that have informed this preliminary Cumulative Effects assessment.
- 21.1.6 It is important to note that the reporting of Cumulative Effects generally rely on the final reported residual (post mitigation) effects from the preceding chapters of the Environment Statement (ES) (Chapters 5 to 20 of this PEIR) being complete and a defined data set of other Committed Developments (both geographic and temporal). Both of these requirements are by their nature not complete at this stage of the Project and so this chapter provides only a preliminary assessment of potential Cumulative Effects that could result from the Project.

- 21.1.7 This chapter should be read in conjunction with:
- Chapter 2: Project Description.
 - Chapter 4: EIA Methodology.
 - Chapters 5 to 20: in relation to baseline conditions and potential residual effects to be considered as part of the Cumulative Effects assessment.
- 21.1.8 This chapter is supported by the following appendices:
- Volume 4 - Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments.

21.2 Legislation, Policy and Guidance

Legislation

- 21.2.1 Legislation relevant to the Cumulative Effects assessment are detailed in Table 21-1.

Policy

National Planning Policy

- 21.2.2 National Planning Policy relevant to the Cumulative Effects assessment are detailed in Table 21-2.

Local Planning Policy

- 21.2.3 Local Planning Policies relevant to the Cumulative Effects assessment are detailed in Table 21-3.

Guidance

- 21.2.4 There is no standard method of undertaking a Cumulative Effects assessment and there is a wide variety of guidance available. The specific guidance used as part of this Cumulative Effects assessment comprises the 'Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment' (Ref 21.1).

Table 21-1 – Summary of Legislation relevant to Cumulative Effects

Legislation	How it is considered within this PEIR
EU EIA Directive 2014/52/EU (Ref 21.2)	Under Section 5 (2) of the EIA Directive (2015/52/EU) the EIA must do the following: “The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the Project on the following factors a. Population and human health; b. Biodiversity, with particular attention to species and habitats under Directive 92/43/EEC and Directive 2009/147/EC; c. Land, soil, water, air and climate; d. Material assets, cultural heritage and the landscape; e. The interaction between factors referred to in sub-paragraphs (a) to (d).” The purpose of this Cumulative Effects assessment is to address item (e) above by assessing whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects alone, that may arise from the construction / commissioning, operation, maintenance and decommissioning of the Project.
Infrastructure Planning (EIA) Regulations 2017 (Ref 21.3)	Schedule 4 paragraph 5(e) of the Infrastructure EIA Regulations 2017 requires that an ES should include a description of Cumulative Effects resulting from: “The cumulation of effects with other existing and, or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources”. The purpose of this Cumulative Effects assessment is to address item Schedule 4 paragraph 5(e) by assessing whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects alone, that may arise from the construction / commissioning, operation, maintenance and decommissioning of the Project.

Table 21-2 – Summary of National Planning Policy relevant to Cumulative Effects

Planning Policy Reference	Policy Context	How it is considered within this PEIR
EN-1		
Paragraph 4.1.5	The Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 21.4) paragraph 4.1.5 states that the Secretary of State needs to take into account: “Its potential adverse impacts, including on the environment, and including and long-term and cumulative adverse impacts, as well as any measures to avoid, reduce, mitigate or compensate for any adverse impacts, following mitigation hierarchy.”	The purpose of this Cumulative Effects assessment is to assess whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects alone, that may arise from the construction / commissioning, operation, maintenance and decommissioning of the Project.
Paragraph 4.2.12	The NPS for Energy (EN-1) also states in paragraph 4.2.12 that: “The cumulative impacts of multiple developments with residual impacts should also be considered.”	

Table 21-3 – Summary of Local Planning Policy relevant to Cumulative Effects

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
Selby Local Plan (Ref 21.5)	Policy SG10 – Low Carbon and Renewable Energy (Strategic Policy)	Opportunities for Low Carbon and Renewable Energy generation and storage should be considered in line with the following: A. Proposals for low carbon and renewable energy storage and generation will be supported where: 1. Planning impacts of the development and associated infrastructure, both individually and cumulatively, are, or can be made, acceptable; 2. Appropriate weight, consideration and mitigation has been given to the following where applicable: 1. Landscape character and sensitivity; 2. Designated nature conservation sites, features, functionally linked land, protected habitats and species; 3. Designated and non-designated heritage assets and their settings; 4. Hydrology and water quality; 5. Impact on Infrastructure and Transport Networks including highways, rail, aviation operations, navigational systems, PRow, television, radio, telecommunications systems; 6. Living conditions and amenity including due to noise, odour, dust, vibration, visual intrusion, shadowing or flicker.	The Cumulative Effects assessment along with the assessments provided in Chapter 5 to 20 of the ES would inform decision making in relation to item 1 of Policy SG10 – Low Carbon and Renewable Energy (Strategic Policy)
	4 Strategic Growth Policies – 4.54	All types of renewable and low carbon development, storage and associated infrastructure have the potential to impact on the landscape of the district but also need to be considered in the context of other potential adverse effects. As a result, a considerations based policy has been developed as the most appropriate approach to help guide and assess proposals and their mitigation. Consideration of adverse effects should include the associated infrastructure to development such as ancillary buildings, fencing, lighting etc as well as both permanent and temporary impacts. Cumulative impacts should consider the proposals in combination with relevant existing developments, development under construction, with planning permission, and awaiting planning approval.	The purpose of this Cumulative Effects assessment is to assess whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects alone, that may arise from the construction / commissioning, operation, maintenance and decommissioning of the Project
East Riding of Yorkshire Local Plan (Ref 21.6)	Policy EC5: Supporting the renewable and low carbon energy sector	A. Proposals for the development of the energy sector, excluding mineral extraction, but including all other types of development listed in Table 13, will be supported where any significant adverse impacts are addressed satisfactorily, and the residual harm is outweighed by the wider benefits of the proposal. Developments and their associated infrastructure should be acceptable in terms of: 1. The cumulative impact of the proposal with other existing and proposed energy sector developments.	The Cumulative Effects assessment along with the assessments provided in Chapters 5 to 20 of the ES would inform decision making in relation to item 1 of Policy EC5: Supporting the renewable and low carbon energy sector
		Cumulative impacts that would result from new proposals, could start to constrain development in some locations, which would otherwise be suitable for development. Cumulative impact assessments should consider existing	The Cumulative Effects assessment along with the

Planning Document	Policy Ref	Policy Context	How it is considered within this PEIR
		developments and those with an extant planning permission, including developments within neighbouring local authority areas. Information should be provided with the application to address the: • Degree or magnitude of change; • and Nature of the potential change reflecting the inherent sensitivity of the affected area, feature or species	assessment provided in Chapters 5 to 20 of the ES would inform decision making in relation to item 1 of Policy EC5: Supporting the renewable and low carbon energy sector
North East Lincolnshire Local Plan 2013 to 2032 (Ref 21.7)	Policy 31: Renewable and low carbon infrastructure	2. Proposals for renewable and low carbon energy generating systems will be supported where any significant adverse impacts are satisfactorily minimised and the residual harm is outweighed by the public benefits of the proposal. Developments and their associated infrastructure will be assessed on their merits and subject to the following impact considerations, taking account of individual and Cumulative Effects: A. the scale and nature of the impacts on landscapes and townscapes, particularly having regard to the Landscape Character Assessment and impact on the setting and scenic beauty of the AONB; B. local amenity, including noise, air quality, traffic, vibration, dust and visual impact; C. biodiversity, geodiversity and nature conservation, with regard given to the findings of the site and project specific HRA and potential impacts on SPA birds, where appropriate; D. the historic environment, including individual and groups of heritage assets; E. telecommunications and other networks; including the need for additional cabling to connect to the National Grid, electromagnetic production and interference, and aeronautical impacts such as on radar systems; F. highway safety and network capacity; G. increasing the risk of flooding; and, H. the land, including land stability, contamination, soils resources and loss of agricultural land	The purpose of this Cumulative Effects assessment is to assess whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects alone, that may arise from the construction / commissioning, operation, maintenance and decommissioning of the Project.

21.3 EIA Scoping Opinion and Engagement

Response to the EIA Scoping Opinion

- 21.3.1 A summary of the EIA Scoping Opinion from the Planning Inspectorate (PINS), received February 2025, which includes consultation responses from a variety of statutory consultees as they relate to the Cumulative Effects assessment and our responses to this Scoping Opinion are outlined in Table 21-4 below.

Table 21-4 – Summary of Scoping Opinion relevant to Cumulative Effects

Section Reference	Matter	Comments	Response
Table 20-4	Scoping out of Traffic and Transport from Cumulative Effects assessment.	“The Scoping Report states that transport and associated assessments of vehicle emissions are inherently considered to be cumulative as they incorporate modelled traffic data growth for future traffic flows and are based on a worst-case scenario. Provided the ES can clearly evidence that traffic movements from other NSIPS / major developments in the vicinity are incorporated in the model (including from construction phase), the Inspectorate is content this matter can be scoped out. However, should the traffic model not address construction traffic movements of other NSIPs and major developments, then the applicant should consider the location, timing and duration of other NSIPs / major developments and provide an assessment of likely significant effects”.	In relation to the statement that 'should the traffic model not address construction traffic movements of other Nationally Significant Infrastructure Projects (NSIP) and major developments, then the Applicant should consider the location, timing and duration of other NSIPs / major developments and provide an assessment of likely significant effects' - it is agreed that such Committed Developments, if not contained within the traffic model, will be considered qualitatively as part of the Cumulative Effects assessment.
		“The Inspectorate also considers that the cumulative impacts of fugitive dust emissions and NRMM during the construction phase should be assessed, where significant effects are likely”.	It is agreed that the cumulative impacts of fugitive dust emissions and Non-Road Mobile Machinery (NRMM) during the construction phase will be assessed in line with the agreed methodology as set out in Chapter 6: Air Quality, where significant effects are considered likely.
Table 20-4	Scoping out of Important Ecological Features (IEF) from Cumulative Effects assessment.	Whilst the Inspectorate expects in-combination effects on European sites to be presented within the Habitats Regulations Assessment, an assessment of cumulative effects should still be presented within the ES. Table 20-4 also does not confirm whether cumulative effects on IEFs other than ‘designated HRA sites’ would be assessed. Any likely significant cumulative effects on IEFs should be assessed within the ES.	It is agreed that any likely significant Cumulative Effects on IEFs will be assessed within the ES. However, elements of this factor have been specifically scoped out of the Cumulative Effects assessment as Chapter 7: Ecology & Biodiversity will consider the potential interactions of other environmental factors such as Noise and Air Quality on relevant IEF (refer to Section 7.4.9 of Chapter 7 for further details on ecology assessment). As the Noise and Air Quality assessments are inherently considered to be cumulative, (they incorporate modelled traffic data growth for future traffic flows that are based on other Committed Developments and are a worst-case scenario), it is not considered that an additional qualitative assessment would need to be undertaken as part of the Cumulative Effects assessment. However, the findings will be reported as part of this chapter.
Table 20-4		The Scoping Report states that transport and associated assessments of vehicle noise emissions are inherently considered to be cumulative as they incorporate modelled traffic data growth for future traffic flows and are based on a worst-case scenario. Provided the ES can clearly evidence that traffic movements from other NSIPS/major developments in the vicinity are	It is agreed that such Committed Developments, if not contained within the model, will be considered qualitatively as part of the cumulative assessment.

Section Reference	Matter	Comments	Response
		incorporated in the model (including from construction phase), the Inspectorate is content this matter can be scoped out. However, should the traffic model not address construction traffic movements of other NSIPs and major developments, then the applicant should consider the location, timing and duration of other NSIPs/major developments and provide an assessment of likely significant effects. The Inspectorate also considers that cumulative noise impacts from construction activities and operation of the Pump Facility should be assessed, where significant effects are likely.	
Paragraph 20.6.2		Paragraph 20.6.2 states that “the initial long list search will be based on a search area of 2km from the draft Order Limits for all Major developments or allocated sites from the relevant Local Plans”. The Inspectorate agrees with the MMO’s suggestion to increase this radius to 5km to account for possible impacts on mobile species. This is on the basis that Tables 7-6 and 19-7 identify a zone of influence of up to 5km for bats, wintering / passage birds, fish and mammals. Similarly, consideration should be given to expanding the long list where appropriate to 15km to align with the coastal processes study area	In relation to the first item, it is agreed that the search area for the long list will be increased from 2km to 5km. The criteria for the planning data to be collected within the new 2km to 5km search area will however differ from the up to 2km search area. The criteria for the collection of Committed Developments within this new search area will be only those developments that are considered to have significant environmental effects (i.e. applications that have been accompanied by an EIA). In relation to the second item, it is not considered proportionate to collect a full set of Committed Development data within 15km of the entire Project and its draft Order Limits. As suggested appropriate consideration will be given to Committed Developments that may impact Coastal Processes within 15km on a case-by-case basis and be based on the professional judgment of the competent expert undertaking this distinct element (Coastal Processes) of the cumulative assessment and through engagement with the Marine Management Organisation (MMO).
CLdN		We also note that there is a reference in Appendix E Cumulative Impacts NSIPS to EN010038 North Killingholme Thermal Generating Station. This is marked as “accepted”. In fact, that project is authorised under a DCO, the North Killingholme (Generating Station) Order 2014, as amended. It was promoted by an affiliated company of CLdN, C.GEN Killingholme Limited. The project has recently been sold but the main access for the project – which is schedule for development – is along the route allocated by the HCLP project for construction traffic, which is likely to not only give rise to cumulative effects but also directly impact the construction of the generating station comprised in the authorised project.	The long list has been updated to reflect this and other updates to the status of Committed Developments (see Appendix 21.1 - Cumulative Assessment – Long / Short List of Committed Developments). Noting the scale of the authorised development (EN010038) and the potential length of the accompanying construction phase, there is potential for Cumulative Effects on all environmental factors scoped into the Cumulative Effects assessment. However, this will be confirmed following the completion of reporting of residual (post mitigation) effects from all other topics in the ES.
Drax		The EIA should assess the cumulative impacts of the HCCP project with the Drax BECCS scheme, informed by the ES submitted with the Drax BECCS Scheme.	In relation to the first item, it is agreed that Committed Development (Drax BECCS - NSIP Ref: EN010120) will be assessed as part of the Cumulative Effects assessment.

Section Reference	Matter	Comments	Response
Lincolnshire County Council		LCC would note there are several other NSIP applications currently proposed or consented within Lincolnshire, whilst the principal sites are located outside of the proposed ZOI wider implications, particularly traffic and transport may have some interactivity and cumulative impact. Consideration should be given to the geographical scale of all the other NSIP projects within Northeast Lincolnshire and in adjacent authority areas (including Lincolnshire). The cumulative assessment and the impact of this proposal cumulatively with these other projects should be kept under review.	The search area for NSIPs will remain at 10km which is wider than the Zone of Influence (Zol) set out in each of the topic chapters (Chapters 5 to 20 of the PEIR. The Applicant considers these proportionate to the subject Project and its potential impacts, relevant Zol and is in keeping with best practice approach on Cumulative Effects assessment on other NSIP relating to similar projects. Further engagement with all relevant local authorities will be undertaken in relation to the final Long and Short List. The Applicant would be happy to consider Committed Developments outside of this search area on a case by case basis, where justification can be provided via consultation with the relevant local authorities.
MMO		The MMO notes that the applicant has stated that “Based on the Zones of Influence for the different environmental topics from the Environmental Statement (ES) and professional judgement, the initial long list search will be based on a search area of 2km from the draft Order Limits for all Major Developments or allocated sites from the relevant Local Plans ...”. The MMO recommends that this radius is increased to 5km to account for possible impacts on mobile species. This is in line with the 5km study area for biodiversity receptors, as identified in Figure 19.1, Volume 2. The applicant should also consider expanding the long list where appropriate to 15km to align with the coastal processes study area (Figure 19.1, Volume 2).	In relation to the first item, it is agreed that search area for the long list will be increased from 2km to 5km. The criteria for the planning data to be collected within the new 2km to 5km search area will however differ from the up to 2km search area. The criteria for the collection of Committed Developments within this new search area will be that only those developments that are considered to have significant environmental effects (i.e. applications that have been accompanied by an EIA) will be collected and recorded. In relation to the second item, it is not considered proportionate to collect a full set of Committed Development data within 15km of the entire Project and its draft Order Limits. As suggested appropriate consideration will be given to Committed Developments that may impact Coastal Processes within 15km on a case-by-case basis and be based on the professional judgment of the competent expert undertaking this distinct element (Coastal Processes) of the cumulative assessment and through engagement with the Marine Management Organisation.
National Highways		Cumulative Impact Assessment - National Highways would highlight that in accordance with Planning Practice Guidance, the Committed Development should include development that is consented or allocated where there is a reasonable degree of certainty will proceed within the next 3 years.	Agreed – The criteria for the collection of Committed Development has been informed by Table 2 from the PINS Advice Note (Ref 21.8), with this used to indicate the level of certainty assigned to each Committed Development, from Tier 1 (most certain) to Tier 3 (least certain).
North Yorkshire Council		Cumulative Effects – the LVIA should consider cumulative landscape and visual effects in conjunction with other similar developments in the study area including those currently being considered or approved by planning authorities but not yet implemented. The LVIA should also consider the significance of the connection point at Drax Power Station and ongoing erosion of the landscape baseline. Cumulative assessment is mentioned within Chapter 10 [sic]. We would wish to agree a methodology and	Agreed - The Cumulative Effects assessment will include an assessment of cumulative landscape and visual impacts as per standard Landscape and Visual Impact Assessment (LVIA) best practice. The Long List of Committed Development includes the noted developments at the Drax Power Station. The Long List of Committed Developments as provided as part of the Scoping Report was a snapshot at a fixed period in time, with data

Section Reference	Matter	Comments	Response
		approach for the cumulative assessment. There are a numbers of major schemes including NSIPs which overlap or are in proximity to Drax Power Station. The Provisional Long List at Appendix E should be reviewed and updated (e.g. NY/2023/0159/ENV Barlow Ash Mound is absent).	collection being an iterative process up until an agreed point in time prior to submission of the DCO. Each local authority will be sent both the Long List and final Short List of development for review prior to the final Cumulative Effects assessment being undertaken.

Summary of Engagement

- 21.3.2 The initial Long List of Committed Developments (see Section 21.4) to inform the inter-project effects assessment, as accompanied the EIA Scoping Report, was sent to each relevant local authority prior to submission to PINS in January 2025. Feedback was received from the local authorities with additional Committed Developments added to the initial Long List prior to EIA Scoping Report being submitted.
- 21.3.3 The initial Long List of Committed Developments as provided in the EIA Scoping Report was a snapshot at a fixed period in time, with data collection being an iterative process up until an agreed point in time prior to the final submission of the DCO.
- 21.3.4 No further specific engagement in relation to the Cumulative Effects assessment has been undertaken to date, other than the comments received and addressed from the Scoping Opinion from PINS as detailed in Table 21-4.
- 21.3.5 Further engagement with the local authorities will be undertaken, with all relevant local authorities to be sent both the final Long and Short Lists of Committed Development for review prior to the final Cumulative Effects assessment being undertaken and reported in the ES.

Assessment Methodology

- 21.3.6 There is currently no standard methodology for Cumulative Effects assessment although there is a range of guidance available. The Cumulative Effects assessment used here has followed the general methodology set out in the PINS Advice Note (Ref. 21.8), along with best practice examples garnered from other NSIP projects.
- 21.3.7 The assessment has been qualitative and based on environmental information available at the time of assessment.
- 21.3.8 Where information was not available, assumptions have been made based on professional judgement and clearly stated alongside any uncertainty as part of the assessment.
- 21.3.9 The proposed methodology for each type of cumulative effect is discussed in turn below.

Intra-project Effects

- 21.3.10 Intra-project effects are concerned with the interaction and combination of different residual (post-mitigation) environmental effects of the Project affecting the same Receptor. For example, visual and noise effects during construction effecting the same residential dwelling.
- 21.3.11 Regulation 5 (2) (e) of EIA Regulations 2017 requires that the EIA process should describe and assess in an appropriate manner the interaction between the environmental factors referred to in sub-paragraphs (a) to (d), which are:
- (a) population and human health.
 - (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC.
 - (c) land, soil, water, air and climate.
 - (d) material assets, cultural heritage and the landscape.
- 21.3.12 As part of the Intra-project effects assessment, 'common sensitive receptor groups' have been identified. This approach has been used because a receptor could be affected by more than one environmental topic. The use of this approach takes account of the fact that not all environmental topics considered will report effects on the same specific named receptors, with different locations being reported on and with some environmental topics using representative receptors versus reporting on single receptors. It will allow for differences in approaches to the reporting of effects on different / multiple receptors. These common sensitive receptor groups will be used to report the residual Intra-project effects.

Table 21-5 – Likely Common Sensitive Receptor Groups and Related Environmental Topics

Likely common sensitive receptor groups	Potential Environmental Topics that may result in Intra-project effects
Public Rights of Way (PRoW) (including users of)	Landscape and Visual, Socio-economics, Health and Wellbeing, Traffic and Transport
Biodiversity Sites (non-HRA sites)	Ecology and Biodiversity, Agriculture and Soils, Hydrology and Land Drainage, Air quality, Noise and Vibration

Likely common sensitive receptor groups	Potential Environmental Topics that may result in Intra-project effects
Residents of residential properties	Noise and Vibration, Air Quality, Health and Wellbeing, Traffic and Transport and Landscape and Visual
Local businesses	Noise and Vibration, Socio-economics, Traffic and Transport
Community facilities	Socio-economics, Health and Wellbeing and Traffic and Transport

Inter-project Effects

- 21.3.13 The assessment of inter-project effects is concerned with the residual (post-mitigation) environmental effects of the Project combining and interacting with the residual environmental effects of other 'Committed Developments', including consideration of other parts of the Project, affecting the same receptor.
- 21.3.14 The assessment methodology for inter-project effects and the data collection exercise for the Committed Developments used here follows the 4-stage guidance as provided in the PINS Advice Note (Ref. 21.8). These 4 stages are set out below.
- 21.3.15 Professional judgement has been used, with the initial long list search based on a search area of 2km from the draft Order Limits for all Major Developments or allocated sites from the relevant Local Plans and 10km from the draft Order Limits for other large-scale Committed Developments consented outside of the Town and Country Planning regime such as NSIP or Transport and Works Act Order (TWAO).
- 21.3.16 Following comments received from PINS as part of the EIA Scoping Opinion, the search area for Major Developments was extended to 5km but only for Major Developments that were accompanied by an EIA i.e. by definition such developments may have significant environmental effects.

Stage – 1 Establishing the Long List of Committed Developments

- 21.3.17 An initial 'Long List' of 'Committed Developments' has been identified through a search of the relevant local planning authorities' planning registers, the Planning Inspectorate's planning register, local plans and other publicly available sources. The initial Long List is presented in Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments, with the information gathered and assessed for Stage 1 shown in columns 1 to 8.
- 21.3.18 The scale and nature of the Committed Developments that were collected were informed by the search criteria as set out in Table 21-6.
- 21.3.19 Five years' worth of data was collected for applications consented via the Town and Country Planning Act 1990 – this temporal scope was chosen as the standard length of a valid full planning permission is 3 years and the standard length of a valid outline planning permission is 5 years. Where longer permissions existed (e.g. outline planning permission can last for 10 years), these were identified through the relevant discharge of Reserved Matters applications. No temporal scope was assigned to the collection of data on NSIP or TWAO type applications noting the length of time from application through to the construction phase – a full search of the PINS Programme of projects was undertaken within the search areas.

Table 21-6 – Search Criteria for Committed Developments by Search Area

Search Area	Search Criteria
0 to 2km	All 'Major Developments' as defined in Article 2 (Interpretation) of The Town and Country Planning (Development Management Procedure) (England) Order 2015 (Ref 21.9) this means development involving any one or more of the following: (a) the winning and working of minerals or the use of land for mineral-working deposits; (b) waste development; (c) the provision of dwellinghouses where— (i) the number of dwellinghouses to be provided is 10 or more; or

Search Area	Search Criteria
	(ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i); (d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or (e) development carried out on a site having an area of 1 hectare or more. All NSIP and TWAO or similar large scale infrastructure consenting regimes relating to offshore infrastructure projects Local Plan allocations that fit the definition of Major Development
2km to 5km	Major Developments as defined in Article 2 (Interpretation) of The Town and Country Planning (Development Management Procedure) (England) Order 2015 (Ref. 21.9 but only those developments that are considered to have significant environmental effects (i.e. applications that have been subject to EIA). All NSIP and TWAO or similar large scale infrastructure consenting regimes relating to offshore infrastructure Local Plan allocations that fit the definition of Major Development
5km to 10km	All NSIP and Transport and Works Act Orders (TWAO) or similar large scale infrastructure consenting regimes relating to offshore infrastructure projects

- 21.3.20 Committed developments that are consented via Permitted Development rights via The Town and Country Planning (General Permitted Development) (England) Order (GPDO) 2015 (Ref. 21.9) were not considered, as such developments would generally not have the potential to result in significant environmental effects. Paragraph 10 of Article 3 of the GPDO 2015 effectively negates the use of these rights for EIA Development (which by definition have significant environmental effects) for most types of development. Additionally, such development would generally not require an 'express' consent and so no publicly available information would be available.

- 21.3.21 Consideration has also been given to other developments which form part of the wider East Coast Cluster initiative such as those considered as 'Associated Development'.
- 21.3.22 Table 21-1 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments sets out the collected data from all Town and Country Planning Act applications along with NSIP, TWAO and other large consenting regime applications.
- 21.3.23 Table 21-2 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments sets out the collected data on relevant Local Plan site allocations in a similar manner to Table 21-1.
- 21.3.24 The following information was recorded for each Committed Development and is shown in Tables 21-1 and 21-2 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments:
- The relevant Consenting or Local Authority.
 - The relevant application reference or policy reference in relation to Local Plan allocations reference.
 - A brief description of the Committed Development.
 - Its distance from the most up to date draft Order Limits of the Project or site address.
 - Its status e.g. pending consideration, granted etc.
- 21.3.25 The availability of information needed to undertake the inter-project effects assessment has been dependent on the status and type of the Committed Developments identified (e.g. some Committed Developments may be accompanied by an EIA, some may not and so may only have limited information on the associated environmental effects. Local Plan site allocations are not accompanied by detailed environmental survey information).
- 21.3.26 A level of certainty, based on the available information, was also attributed to each Committed Development. Table 2 from the PINS Advice Note (Ref 21.8) was used as the basis to indicate the level of certainty assigned to each Committed Development, from Tier 1 (most certain) to Tier 3 (least certain) as set out in Table 21-7 with this recorded in Tables 21-1 and 21-2 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments.

Table 21-7 – Committed Development – Level of Certainty

Certainty	Description of Table 2 of PINS Advice Note	Committed Developments have been recorded and assigned certainty in descending order
Tier 1	Under construction. Permitted applications under the Planning Act or other regimes but not yet implemented. Submitted applications under the Planning Act or other regimes but yet to be determined. All refusals subject to appeal procedures not yet determined.	Major Development, NSIP / TWAO or other major infrastructure projects that are under construction. Major Development, NSIP / TWAO or other major infrastructure projects within the last five years that are not yet implemented. Major Development, NSIP / TWAO or other major infrastructure projects that have submitted applications(s) but not yet determined¹⁴. Major Development, NSIP / TWAO or other major infrastructure projects which have been refused but are subject to appeal procedures not yet determined². Other developments which form part of the wider East Coast Cluster initiative have will also been considered based on their status at the time of the submission of the DCO.
Tier 2	Projects on the Planning Inspectorates programme of projects.	Projects on PINS Programme of projects.

^{14& 2} Noting the iterative stage of data collection for the Committed Developments, where applications that have been submitted but not yet determined (or refused but are subject to appeal procedures but are not yet determined (pending consideration)), these were assigned to Tier 3 in Table 21-1 of Appendix 21.1: Long / Short List of Committed Developments. This is because in the interim period between the PEIR and the final submission of the ES, such applications may be refused. This would result in abortive work at this stage of the EIA process were they to be assessed. The Long List will be updated closer to the ES submission date to reflect any changes in the status of such applications.

Certainty	Description of Table 2 of PINS Advice Note	Committed Developments have been recorded and assigned certainty in descending order
Tier 3	Projects on the Planning Inspectorates programme of projects where a scoping report has not been submitted. Identified in the relevant Development Plan and emerging Development Plans, with appropriate weight given as they near adoption, recognising that there will be limited information available on the relevant proposals. Identified in other plans and programmes, as appropriate, which set the framework for future development consents or approvals, where such development is reasonably likely to come forward.	Projects identified in relevant development plans (and emerging development plans) which would have the characteristics of Major Development. Other plans and programmes (as appropriate) which set out the framework for future development consents / approvals, where such development is reasonably likely to come forward and would likely be a Major Development, NSIP / TWAO or other major infrastructure project.

- 21.3.27 Each Committed Development was then considered against the different Zol from the chapters (please see summary provided in Table 21-9 below) to provide an initial view of the potential interactions with different environmental topics e.g. where a Committed Development was located within close proximity of the draft Order Limits e.g. 0.5km, this located the Committed Development within the majority of Zol from the chapters. Where a Committed Development was located for example 4.5km from the draft Order Limits, this located the Committed Development outside the majority of environmental topic chapters Zol. Therefore, the potential for Cumulative Effects was more limited, and would likely relate only to landscape or cultural heritage (above ground heritage assets only). This was recorded in Tables 21-1 and 21-2 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments.
- 21.3.28 Stage 1 was completed with a decision on whether or not to short list the Committed Development based on the information in the preceding columns of Tables 21-1 and 21-2 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments and the approach as set out above.
- 21.3.29 As part of this Cumulative Effects assessment, it is noted that the list of Committed Developments is not complete. Further data will be added in the period between the publishing of the PEIR and the final submission of the DCO. Noting the level of uncertainty relating to Committed Developments that match the criteria in Tier 2 and 3 as set out in Table 21-7 above (e.g. some may be refused or withdrawn in the interim period between the PEIR and the final DCO submission), only Committed Developments that match the criteria in Tier 1 and were located within a relevant Zol as set out in the chapters of the PEIR were carried forward to Stage 2 in this Cumulative Effects assessment .

Stage 2 – Establishing the Short List

- 21.3.30 After Stage 1 – Establishing the Long List of Committed Developments, the long list of Committed Developments was further consolidated into the short list, that considered the following criteria as per the PINS Advice Note (Ref 21.8) – see Table 21-8.

Table 21-8 – PINS Advice Note Further Criteria

Criteria	Description
Temporal scope	Is the consent for the Committed Development still extant and would the construction or operational phase potentially overlap with the Project?

Criteria	Description
	(Phasing details of Committed Developments were / will be reviewed where available)
Scale and nature of development and potential for common receptors	The scale or nature of the Committed Developments, the potential that they share common sensitive receptors with the Project and how likely they are to result in significant Cumulative Effects will be considered.
Other factors	For example, the nature and, or capacity of the receiving environment, which could make a significant cumulative effect with the Committed Developments more or less likely e.g. local topography reducing or increasing the potential for landscape and visual effects. Also, the availability of information that is available and sufficient to allow the identified receptors and residual effects of the Committed Development will be considered. Committed Developments that have no, or insufficient environmental assessment information, will typically not be considered as it will not be possible to accurately identify common receptors or Cumulative Effects.

- 21.3.31 Professional judgement was applied to provide an assessment of the potential for each Committed Development to have inter-project effects during both the construction and operational phases of the Project (Table 21-1 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments). Table 21-2 of Appendix 21.1 relating to local plan allocations does not include this assessment as an application for planning permission, masterplan, Supplementary Planning Document or other planning mechanism may come forward in the interim period between the PEIR and the final submission of the DCO.
- 21.3.32 Stage 2 was completed with a decision on whether or not the Committed Development was to be taken forward to Stages 3 and 4 as set out below. This is as far as this Cumulative Effects assessment can be taken at this stage of the EIA process without abortive work being undertaken. The methodology for Stages 3 and 4 are set out for information below and will be reported in the ES.

Stage 3 – Information Gathering

- 21.3.33 Further detailed information will be collected for the Committed Developments shortlisted in Stage 2 – Establishing the Short List (to be reported in the ES). This information will feed into Stage 4 – Assessment.
- 21.3.34 As per PINS Advice Note (Ref 21.8), this information will include but is not limited to.
- Proposed design and location information.
 - Proposed programme of construction, operation and decommissioning.
 - Environmental assessments that set out baseline data and effects arising from the other existing and, or approved developments.
- 21.3.35 This information will be collated from different sources including the Planning Inspectorate, Local Authority, statutory bodies or other consenting bodies websites and direct liaison with stakeholders.

Stage 4 – Assessment

- 21.3.36 The qualitative evaluation at the receptor level will consider the following:
- Combined magnitude of change.
 - Sensitivity / value / importance of the receptor / receiving environment to change; and / or
 - Duration and reversibility of effect.
- 21.3.37 Through a combination of evaluating the residual effects presented in the ES and the environmental information available for the Committed Developments, conclusions will be drawn as to the likelihood for significant inter-project effects.
- 21.3.38 Each chapter of the ES will present the inter-project effects assessment of their topic. The Cumulative Effects assessment will then summarise the assessment, including reporting where significant inter-project effects have been identified.
- 21.3.39 The ES will also describe measures envisaged to avoid, prevent, reduce, or, if possible, offset any identified significant Cumulative Effects and, where appropriate, any proposed monitoring arrangements. The means of securing delivery of these measures will be explained.

Assumptions and Limitations

- 21.3.40 The assessment of Intra-project effects resulting from the Project will be focused on the residual effects from construction, operational and decommissioning phases following the implementation of mitigation measures that are secured through DCO requirements or other mechanisms.
- 21.3.41 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 for this PEIR chapter.
- 21.3.42 There may be cases that other 'Committed Developments' are screened into the short-list which have environmental information available for some or the majority of topics, but not for others. In such instances, the inter-project effects assessment may be limited to only those topics which have sufficient environmental information to inform an assessment. However, in such cases, efforts will be made for the topics lacking environmental information to make any assessment based upon assumptions. This has been stated in this PEIR chapter and will be included in the ES.
- 21.3.43 Although environmental information may be available for existing and, or approved developments it may be limited in its compatibility where different assessment methodologies or criteria have been used. Where a lack of information limits and / or prevents the cumulative assessment, this has been stated in this PEIR chapter and will be included in the ES.

21.4 Baseline Conditions

Intra-Project Effects

Existing Baseline Conditions

- 21.4.1 The existing and future baselines for the Intra-project effects is the same as those set out in each relevant chapter. The location of baseline conditions for each of the environmental topics are set out in Table 21-9 and are not repeated in this chapter.

Table 21-9 – Environmental Topics and their Location within this PEIR

Environmental Topic	Chapter Where Covered
Air Quality	Chapter 6, section 6.5

Environmental Topic	Chapter Where Covered
Ecology and Biodiversity	Chapter 7, section 7.5
Climate Resilience and Adaptation	Chapter 8, section 8.5
Ground Conditions and Hydrogeology	Chapter 10, section 10.5
Cultural Heritage	Chapter 11, section 11.5
Landscape and Visual	Chapter 12, section 12.5
Noise and Vibration	Chapter 13, section 13.5
Socio-economics, Tourism and Recreation	Chapter 14, section 14.5
Human Health and Wellbeing	Chapter 15, section 15.5
Traffic and Transport	Chapter 16, section 16.5
Waste and Materials	Chapter 17, section 17.5
Hydrology and Land Drainage	Chapter 18, section 18.5
Coastal Processes	Chapter 20, section 20.5

Study Area

- 21.4.2 The Study Area for Intra-project effects comprise the Zol for each chapter and are listed in Table 21-10. The rationale for the distances chosen are explained in the relevant chapters.

Table 21-10 – Environmental Topic Chapter Zones of Influence

Environmental Topic	Zone of Influence
Ecology and Biodiversity	0.5 km – 5 km
Air Quality	0.05 km – 0.25 km
Climate change, adaption and resilience	Zol is based on other chapters.
Ground Conditions and Hydrogeology	0.25 km – 0.5 km
Cultural Heritage	0.5 km
Landscape and Visual	5 km
Noise and Vibration	0.3 km – 0.6 km
Socio-economics, Tourism and Recreation	0.5 km
Human Health and Wellbeing	0.5 km

Environmental Topic	Zone of Influence
Traffic and Transport	0.15 km
Waste and Materials	Within draft Order Limits
Hydrology and land drainage	0.5 km
Coastal Processes	0.5 km – 15 km

Inter-Project Effects

Existing Baseline Conditions

- 21.4.3 The long list of cumulative developments within the Study Area is presented within Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments. This represents the baseline for the inter-project assessment at this stage.

Study Area

- 21.4.4 The Study Area for the inter-project effects are the same as ZOI from the different chapters as set out in Table 21-10 above.

21.5 Design Development, Impact Avoidance and Embedded Mitigation

Intra-project Effects

- 21.5.1 The design development, impact avoidance or embedded mitigation relating to Intra-project Effects are the same as that undertaken or proposed in the relevant environmental topic Chapters 5 to 20 of the PEIR and so are not repeated here. This will be reviewed within the final version of Cumulative Effects assessment in the ES, when the reporting of Cumulative Effects has been completed.

Inter-project Effects

- 21.5.2 Through the collection of Committed Development data, the Project has sought to avoid, where practicable, direct impacts on such developments, through route optioneering or removal of areas within the draft Order Limits.

- 21.5.3 No additional mitigation measures specific to inter-project effects have been identified at this stage, over and above those identified within environmental topic Chapters 5 to 20 of the PEIR. This will be reviewed within the final version of Cumulative Effects assessment (in the ES) when the reporting of Cumulative Effects has been completed.

21.6 Assessment of Potential Impacts

Intra-project Effects

- 21.6.1 The potential impacts associated with the construction, operation and decommissioning phases relating to Intra-project Effects are the same as those set out in the relevant environmental topic Chapters 5 to 20 of the PEIR.
- 21.6.2 The assessment of potential Intra-project impacts for the construction, operation and decommission phases of the Project are set out below in relation to the likely common sensitive receptors in Tables 21-11, 21-12 and 21-13. This is an assessment based on the initial findings set out within the preceding environmental topic chapters.
- 21.6.3 The following approach has been used:
- Column 1 sets out the likely common sensitive receptors as identified from Table 21-5 above.
 - Column 2 denotes the related environmental topics that have the potential for Intra-project effects on the noted common sensitive receptor.
 - Column 3 assigns the common sensitive receptor a sensitivity (low, medium or high) based on professional judgment.
 - Column 4 provides a summary description of the potential impacts based on a review of the environmental topic chapters (Chapter 5 to 20 of the PEIR) and professional judgment.
 - Column 5 then assigns a potential magnitude for the impact (minor, moderate or major).
 - Columns 6 and 7 denote if the impact would be adverse / beneficial and direct / indirect respectively.

Construction

- 21.6.4 Table 21-11 presents receptors with the potential to experience Intra-project effects during construction.

Table 21-11 – Construction Phase – Assessment of Potential Impacts

Common Sensitive Receptor	Environmental Topics	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Adverse / beneficial	Direct / indirect
PRow (including users of)	Landscape and Visual, Socio-economics, Health and Wellbeing, Traffic and Transport	Low	Temporary loss of hedgerows and trees. Visual impacts from construction works on receptors. Severance or diversion.	Minor	Adverse	Indirect
Biodiversity Sites	Ecology and Biodiversity, Agriculture and Soils, Hydrology and Land Drainage, Air quality, Noise and Vibration	Medium to high	Pollution risk – indirect impact to habitat, species from construction pollution, changes in air quality, dust, noise, visual pollution, water quality reduction and soil quality and contamination. Land take – Habitat loss, fragmentation and reduction / loss of IEF quality or function, and disturbance / harm / mortality of associated species. Soil loss, compaction and reduced soil quality.	Minor	Adverse	Indirect
Residents of residential properties	Noise and Vibration, Air Quality, Health and Wellbeing, Traffic and Transport and Landscape and Visual	Medium	Increased vehicle movements on roads consisting of construction traffic. Visual impacts from construction works on receptors. Indirect impact to receptors from construction pollution, changes in air quality, dust and noise.	Minor	Adverse	Indirect
Local businesses	Noise and Vibration, Socio-economics, Traffic and Transport	Low	Increased vehicle movements on roads consisting of construction traffic. Indirect impact to receptors from construction pollution, changes in air quality, dust and noise. Severance or diversion impacting businesses.	Minor	Adverse	Indirect
Community facilities	Socio-economics, Health and Wellbeing and Traffic and Transport	Low	Increased vehicle movements on roads consisting of construction traffic. Indirect impact to receptors from construction pollution, changes in air quality, dust and noise. Severance or diversion impacting access to facilities.	Minor	Adverse	Indirect

Operation

- 21.6.5 Table 21-12 presents receptors with the potential to experience intra-project effects during operation.

Table 21-12 – Operation Phase – Assessment of Potential Impacts

Common Sensitive Receptor	Environmental Topics	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Adverse / beneficial	Direct / indirect
PRoW (including users of)	Landscape and Visual, Socio-economics, Health and Wellbeing, Traffic and Transport	Low	As the pipeline will be below ground, operational impacts are restricted to areas around AGI locations and the Pump Facilities (including access roads). Visual impacts from AGIs or other above ground infrastructure on receptors.	Minor	Adverse	Indirect
Biodiversity Sites (non-HRA sites)	Ecology and Biodiversity, Agriculture and Soils, Hydrology and Land Drainage	Medium to high	As the pipeline will be below ground, operational impacts are restricted to the areas around AGI locations and the Pump Facilities (including access roads) and will include increased lighting, noise and small amounts of carbon dioxide emissions from venting.	Minor	Adverse	Indirect

Common Sensitive Receptor	Environmental Topics	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Adverse / beneficial	Direct / indirect
Residents of residential properties	Noise and Vibration, Air Quality, Health and Wellbeing, Traffic and Transport and Landscape and Visual	Medium	As the pipeline will be below ground, operational impacts are restricted to the areas around AGI locations and the Pump Facilities (including access roads).	Minor	Adverse	Indirect
Local businesses	Noise and Vibration, Socio-economics, Traffic and Transport	Low	As the pipeline will be below ground, operational impacts are restricted to the areas around AGI locations and the Pump Facilities (including access roads).	Minor	Adverse	Indirect
Community facilities	Socio-economics, Health and Wellbeing and Traffic and Transport	Low	As the pipeline will be below ground, operational impacts are restricted to the areas around AGI locations and the Pump Facilities (including access roads).	Minor	Adverse	Indirect

Decommissioning

- 21.6.6 Table 21-13 presents receptors with the potential to experience intra-project effects during decommissioning.

Table 21-13 – Decommissioning Phase – Assessment of Potential Impacts

Common Sensitive Receptor	Environmental Topics	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Adverse / beneficial	Direct / indirect
PRow (including users of)	Landscape and Visual, Socio-economics, Health and Wellbeing, Traffic and Transport	Low	As the pipelines will be retained below ground once decommissioned, decommissioning impacts are restricted to the dismantling of AGIs and the Pumping Facility and include temporary land take (for compounds).	Minor	Adverse	Indirect
Biodiversity Sites	Ecology and Biodiversity, Agriculture and Soils, Hydrology and Land Drainage, Traffic and Transport,	Medium to high	As the pipelines will be retained below ground once decommissioned, decommissioning impacts are restricted to the dismantling of AGIs and the Pumping Facility and include temporary land take (for compounds) and direct and indirect impacts associated with pollution such as: • Pollution impacts (such as dust, noise and visual); and • Increased deposition of nitrogen and other airborne pollutants during the decommissioning phase due to	Minor	Adverse	Indirect

Common Sensitive Receptor	Environmental Topics	Sensitivity	Description of potential impact / change	Magnitude of impact / change	Adverse / beneficial	Direct / indirect
			a deterioration in air quality from plant / vehicle emissions and increased traffic volumes on the affected road network.			
Residents of residential properties	Noise and Vibration, Air Quality, Health and Wellbeing, Traffic and Transport and Landscape and Visual	Medium	As the pipelines will be retained below ground once decommissioned, decommissioning impacts are restricted to the dismantling of AGIs and the Pumping Facility.	Minor	N / A	Indirect
Local businesses	Noise and Vibration, Socio-economics, Traffic and Transport	Low	As the pipelines will be retained below ground once decommissioned, decommissioning impacts are restricted to the dismantling of AGIs and the Pumping Facility.	Minor	N / A	Indirect
Community facilities	Socio-economics, Health and Wellbeing and Traffic and Transport	Low	As the pipelines will be retained below ground once decommissioned, decommissioning impacts are restricted to the dismantling of AGIs and the Pumping Facility.	Minor	N / A	Indirect

Inter-project Effects

- 21.6.7 Professional judgement was applied to provide an assessment of the potential for each Committed Development to have inter-project effects during both the construction and operational phases of the Project (Table 21-1 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments respectively).
- 21.6.8 Table 21-2 in relation to local plan allocations does not include this assessment at this stage as an application for planning permission may come forward in the interim period between the PEIR and the final submission of the DCO, to be reported in the ES.

21.7 Additional Mitigation and Enhancement Measures

Intra-cumulative Effects

- 21.7.1 Relevant additional mitigation and or enhancement measures are listed within each of the environmental topic chapters of this PEIR (Chapter 5 to 20) and are not repeated here.

Inter-cumulative Effects

- 21.7.2 No additional mitigation and or enhancement measures specific to Cumulative Effects have been identified at this stage, over and above those identified within each chapter. This will be reviewed and reported within the ES.

21.8 Summary of the Assessment of Potential Significant Effects

Intra-project Effects

- 21.8.1 As there is the potential for significant effects in relation to the environmental topics as set out in Chapters 5 to 20 of this PEIR, there is the potential for Intra-project significant effects between them. Table 21-14 below summaries the assessment of potential significant effects associated with the Project.

Table 21-14 – Summary of the Assessment of Potential Intra-project Significant Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
PRoW (including users of)	Low	Construction, Operation and Decommissioning	Potential human health and visual impacts as a result of construction and AGI locations.	Construction, Operation and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft Construction Environmental Management Plan (CEMP)	Unlikely to be significant following the implementation of agreed mitigation measures
Designated Biodiversity Sites)	Medium to high	Construction and Decommissioning	Potential ecology, soils and hydrology impacts as a result of Land take i.e. habitat loss, fragmentation and reduction / loss of IEF quality or function, disturbance / harm / mortality of associated species; and soil compaction / loss Pollution risk – direct and indirect impact to habitat, species, soils and water supplies from construction pollution. Changes in water and sediment. Soil contamination from construction and decommissioning	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP	Potential for significant effects – this will be confirmed following the development of mitigation, enhancement and / or compensation measures (where required).
Residents of residential properties	Medium	Construction and Decommissioning.	Potential traffic and transport, human health, air quality and landscape and visual impacts due to construction activities. Potential impact to receptors during decommissioning due to dismantling of AGIs and Pump facilities.	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP	Unlikely to be significant following the implementation of agreed mitigation measures
Local businesses	Low	Construction and Decommissioning	Potential traffic and transport, human health, air quality and landscape and visual impacts due to construction activities. Potential impact to receptors during decommissioning due to dismantling of AGIs and Pump facilities.	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP.	Unlikely to be significant following the implementation of agreed mitigation measures
Community facilities	Low	Construction and Decommissioning	Potential traffic and transport, human health, air quality and landscape and visual impacts due to construction activities.	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP	Unlikely to be significant following the implementation of agreed mitigation measures

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
			Potential impact to receptors during decommissioning due to dismantling of AGIs and Pump facilities.			

Inter-project Effects

- 21.8.2 It is considered likely that noting the scale of the Project and its proximity to a number of Committed Developments, that significant inter-project effects may occur. An assessment of the potential inter-project effects where this may arise is provided in Table 21-1 of Appendix 21.1: Cumulative Assessment – Long / Short List of Committed Developments.
- 21.8.3 This Project, in-combination with the offshore pipeline would enable future carbon capture projects to transport and store carbon (within the Endurance store) and would remove up to 17 million tonnes per year of carbon from being emitted to the atmosphere. The reduction in CO₂ emissions would have a beneficial effect of major significance.
- 21.8.4 This is as far as these Cumulative Effects assessment for inter-project effects can be taken at this stage of the EIA process bearing in mind the list of projects will need to be refreshed and reported in the ES. Further assessment will be undertaken and presented in the ES including the extent of likely significant effects.

21.9 Next Steps

Design Development

- 21.9.1 No potential intra-project effects have been identified at this stage that would require design changes to the Project beyond those noted in the environmental topic chapters (Chapters 5 to 20 of this PEIR).
- 21.9.2 In relation to inter-project effects, through the collection of Committed Development data, the Project has sought avoid, where practicable, to avoid direct impacts on such developments, through route optioneering or removal of areas within the draft Order Limits.
- 21.9.3 The design development of the Project will continue to be reviewed to assess potential Cumulative Effects. The Project's final design will be assessed and reported in the ES.

Engagement

- 21.9.4 There will be ongoing discussions with local authorities that the Project is located within, together with the neighbouring local authorities in which the

cumulative planning applications overlap, to finalise the long list and short list of other developments. The final lists will be presented within the ES.

Surveys

- 21.9.5 No surveys related to the Cumulative Effects assessment are required for the ES.

Further Assessment

- 21.9.6 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.
- 21.9.7 A full Cumulative Effects assessment and combined effects assessment will be undertaken as part of the EIA and will be reported in the ES.

21.10 References

- Ref 21.1: Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment (Updated 25 March 2025). Available at: [Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK](#)
- Ref 21.2: European Commission Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU)
- Ref 21.3: The Infrastructure Planning (Environmental Impact Assessment Regulations 2017. Available at: [The Infrastructure Planning \(Environmental Impact Assessment\) Regulations 2017](#)
- Ref 21.4: Department for Energy Security and Net Zero (2023) National Policy Statements (NPS). The Overarching NPS for Energy (EN-1)
- Ref 21.5: Selby District Council Local Plan (2022). [Publication Local Plan](#)
- Ref 21.6: East Riding Local Plan Update 2020-2039 (April 2025) [LPU - Strategy Document Update Adopted 2025.pdf](#)
- Ref 21.7: North East Lincolnshire Local Plan 2013 to 2031 (Adopted 2018) Lincolnshire [2018 - New Local Plan 2013 to 2032](#)
- Ref 21.8: The Planning Inspectorate (2024) Advice on Cumulative Effects Assessment. Available at: [Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK](#)
- Ref 21.9: Article 2 (Interpretation) of The Town and Country Planning (Development Management Procedure) (England) Order 2015. Available at [The Town and Country Planning \(Development Management Procedure\) \(England\) Order 2015](#)

22 Summary

22.1 Introduction

- 22.1.1 This Preliminary Environmental Information Report (PEIR) for the Humber Carbon Capture Pipeline Project, has been prepared by Arcadis on behalf of the Applicant. The Humber Carbon Capture Pipeline (HCCP) (the Project) is being developed by Net Zero North Sea Storage (NZNSS Ltd) Limited (the Applicant), which is the promoter entity for the Northern Endurance Partnership (NEP).
- 22.1.2 The Project comprises a pipeline to transport carbon dioxide (to facilitate carbon capture and storage (CCS)), along with associated Above Ground Installations (AGIs) and a Pump Facility to facilitate transport of the carbon dioxide offshore, where it will be permanently stored within a saline aquifer under the North Sea.
- 22.1.3 The Project would be built predominantly underground between the Drax area in North Yorkshire, and the coast north of Easington in the East Riding of Yorkshire, crossing through North Lincolnshire and North East Lincolnshire.
- 22.1.4 The purpose of this PEIR is to enable specialist and non-specialist consultees from the community and consultation bodies to understand the potential environmental effects of the Project.
- 22.1.5 Chapter 2 of this PEIR contains the Project Description. The preliminary environmental assessment is included in Chapters 5 to 21. This chapter summarises the preliminary assessment of potential significant effects in the following tables and text.

22.2 Agriculture and Soils

Table 22-1– Summary of the Preliminary Assessment of Potential Significant Effects – Agriculture and Soils

Receptor / resource	Variable	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Agricultural land from temporary loss	ALC Grades 1&2	Very High	Construction	Minor (for ALC Grades 1, 2, 3a, 3b and 4) due to temporary loss of agricultural land from the trenching work of the pipeline construction, compounds and haul roads, approximately 483 ha	Construction period and up to 5 years after the construction phase	Embedded mitigation measures as stated in Chapter 5, Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation, Table 5-15 and Appendix 5.1: Outline Soil Management Plan	Large adverse / significant
	ALC Grade 3a	High					Moderate adverse / significant
Agricultural land from temporary loss	ALC Grades 1&2	Very High	Construction	Permanent loss of agricultural land associated with the AGIs and Pump Facility, approximately 22.2ha	Permanent, once the land is taken and construction starts	N/A	Moderate adverse / significant
	ALC Grade 3	Very High					Moderate adverse / significant
Soil function and soil volume from temporary land take	Biomass production (ALC Grades 1 & 2)	Very High	Construction	Minor (for the soils from ALC Grades 1, 2, 3a, 3b and 4) due to temporary disturbance to soils from the trenching work of the pipeline construction, compounds and haul roads from approximately 483 ha farmland	Construction period	Embedded mitigation measures as stated in Chapter 5, Section 5.6 Design Development, Impact Avoidance and Embedded Mitigation, Table 5-15 and Appendix 5.1: Outline Soil Management Plan	Large adverse / significant
	Biomass production (ALC Grade 3a)	High					Moderate adverse / significant
Soil function and soil volume from permanent land take	Biomass production (ALC Grades 1 & 2)	Very High	Construction	Loss of soil function and volume from agricultural production	Moderate	Soils to be reused and Appendix 5.1: Soil Management Plan	Moderate / significant
	Biomass production (ALC Grade 3)	High			Moderate		Moderate / significant

Receptor / resource	Variable	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Reinstated agricultural land (approximately 22.2 ha) from AGIs and Pump Facility		Very high /High	Decommissioning	The land of permanent land take from AGIs and Pump Facility returned for agricultural use after decommissioning (based on the assumption that the land will be restored to previous ALC Grades)	Permanent after Decommissioning phase	Soil Management Plan	Major positive / significant
Soil temperature from the heat emission of the pipeline	To be assessed in ES	To be assessed in ES	Operation	Impact on soil temperature, water, rooting and subsequently crop growth	To be assessed in ES	To be assessed in ES	To be assessed in ES
Soil structure	To be assessed in ES	To be assessed in ES	Construction	Damage to soil structure from soil handling	To be assessed in ES	To be assessed in ES	To be assessed in ES
Temporary effects on individual agricultural land holding	To be assessed in ES	To be assessed in ES	Construction / Decommissioning	Temporary severance and disruption to farming activities from construction and decommissioning activities	To be assessed in ES	To be assessed in ES	To be assessed in ES

22.3 Air Quality

Table 22-2 – Summary of the Preliminary Assessment of Potential Significant Effects – Air Quality

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Sensitive ecological and human receptors within 200 m of roads that may be affected by the Project	High	Construction, operational and decommissioning	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle emissions.	Construction, operational and decommissioning phase	Will be reported in the ES	Uncertain but likely to be not significant. Will be reported in the ES
Sensitive ecological and human receptors within 200 m of construction areas where NRMM are likely to be present.	High	Construction and decommissioning	Potential increase in NO ₂ , PM ₁₀ and PM _{2.5} concentrations and nitrogen deposition rates as a result of construction vehicle.	Construction and decommissioning phase	Will be reported in the ES	Likely to be not significant due to temporary and transient nature – will be reported in the ES

22.4 Ecology and Biodiversity

Table 22-3 – Summary of the Preliminary Assessment of Potential Significant Effects – Ecology and Biodiversity

IEF (and importance)	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
River Humber Corridor and Holderness Coast (International)	Construction	Potential habitat loss / fragmentation (direct and to land functionally linked to IEF), pollution (air, noise, vibration, light, water / sediment quality) and species disturbance / harm / mortality (including from vessels, lighting and noise, with indirect effects via prey availability).	Short - Medium-term	Standard embedded measures (CEMP, surveys, method statements, reinstatement, ECoW) plus HRA-led controls, trenchless installation and route optimisation, coastal monitoring / reinstatement, noise management (e.g. vibratory piling, modelling), and minimisation of construction footprint. HRA / ES to document additional measures to reduce significance of pollution (e.g. construction hoarding and habitat provision during construction period).	Uncertain but likely Not Significant following mitigation.
	Operation	River Humber Corridor: None (scoped out). Holderness Coast: Risk of lighting and noise disturbance to species.	Long-term	Controls to be set out in the Biodiversity Management Plan and HRA, with lighting minimised in duration, intensity and spill; details to be confirmed in the ES Noise / Lighting assessments.	Uncertain but likely Not Significant.
Eskamhorn Meadows and Eastoft Meadow (National)	Construction	Pollution risk: air quality changes from the ARN.	Medium-term	Embedded CEMP measures (method statements, pollution controls). To be further assessed once ARN is fully understood and impacts assessed.	Uncertain.
The Lagoons SSSI (National)	Construction	Risk of indirect impacts (air, dust, noise, visual) during construction.	Medium-term	Embedded CEMP measures (method statements, pollution controls).	Uncertain but likely Not Significant following mitigation.
	Decommission	Risk of indirect impacts (air, dust, noise, visual) during decommissioning.	Medium-term	Embedded DEMP measures (method statements, pollution controls).	Uncertain but likely Not Significant following mitigation.
Other non-statutory designated sites situated within the draft Order Limits (County)	Construction	Risk of habitat loss, fragmentation, and pollution impacts (air, noise, dust, vibration, light) to non-statutory sites.	Medium-term	Embedded CEMP / Biodiversity Management Plan measures (surveys, method statements, reinstatement, ECoW) plus site-specific measures developed with stakeholders where land take may occur.	Uncertain but likely Not Significant following mitigation.
Other non-statutory designated sites situated outside the draft Order Limits but with a potential impact pathway (County)	Construction	Risk of pollution and air quality changes from ARN.	Medium-term	Embedded CEMP measures (method statements, pollution controls); assessment to be updated once ARN effects are confirmed.	Uncertain but likely Not Significant following mitigation.

IEF (and importance)	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Other notable sites: Keadby Ash Tip and Newton Garth (Up to National)	Construction	Risk of habitat loss, fragmentation, and pollution impacts (air, dust, noise, vibration, light).	Medium-term	Embedded CEMP / Biodiversity Management Plan measures (surveys, method statements, reinstatement, ECoW), with additional site-specific mitigation to be developed in the ES.	Uncertain but likely Not Significant following mitigation.
	Decommission	Risk of pollution and air quality changes from ARN.	Medium-term	Embedded DEMP measures (method statements, pollution controls); assessment to be updated once ARN effects are confirmed.	Uncertain but likely Not Significant following mitigation.
Terrestrial and Freshwater Habitats (including recognised areas of priority habitat) situated outside of the above IEFs (Negligible to County)	Construction	Risk of habitat loss and pollution (air, dust, water quality).	Medium-term	Embedded CEMP / Biodiversity Management Plan measures (surveys, method statements, reinstatement, ECoW), with additional measures developed for sensitive habitats via HRA. Exploration of gains such as woodland and wetland planting for biodiversity and flood benefits.	Uncertain but likely Not Significant following mitigation.
	Decommission	Risk of habitat loss and pollution (air, dust, water quality) during decommissioning.	Medium-term	Embedded DEMP measures (method statements, surveys, reinstatement and habitat enhancement).	Uncertain but likely Not Significant following mitigation.
Benthic ecology	Construction	Potential habitat loss, fragmentation, and indirect impacts (e.g. smothering, contamination) in intertidal zones at the Humber, Trent and Easington Landfall.	Short-term	Embedded measures including trenchless installation, route optimisation, limited use of coastal infrastructure, coastal monitoring / reinstatement, and adherence to best practice / CEMP (with post-installation surveys if required).	Uncertain but likely Not Significant following mitigation.
	Operation	Accidental release of carbon dioxide.	Short-term	Embedded design safety mechanisms and leak detection	Uncertain but likely Not Significant following mitigation.
Protected and Noteworthy Species (flora, invertebrates, fish, reptiles, birds, bats, badger,	Construction	Risk of species disturbance, harm or mortality from construction (including underwater noise, vibration, lighting, water quality changes), plus indirect impacts from habitat loss, fragmentation and pollution (air, dust, noise, vibration, light).	Short - Medium-term	Embedded CEMP / Biodiversity Management Plan measures (surveys, method statements, reinstatement, ECoW), with additional HRA-led measures for birds and marine mammals.	Uncertain but likely Not Significant following mitigation.
	Operation	Risk of disturbance to nocturnal species from operational lighting, and potential ecological effects from accidental release of carbon dioxide from the operational pipeline.	Long-term	Lighting controls within Biodiversity Management Plan / HRA (minimised duration, intensity and spill). Embedded pipeline safety systems and emergency response protocols. Details to follow in ES assessments.	Not Significant, subject to adequate lighting strategy and integrity measures.

IEF (and importance)	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
otter, water vole and marine mammals) (Negligible to Regional)	Decommission	Risk of disturbance, mortality and indirect impacts (habitat loss, fragmentation, pollution) during decommissioning.	Medium-term	Embedded DEMP measures (surveys, method statements, reinstatement and habitat enhancement).	Uncertain but likely Not Significant following mitigation.
Arboricultural features (TPOs and veteran trees) (Local to Regional)	Construction	Risk of indirect impacts (air quality, dust) from ARN.	Medium-term	Embedded CEMP measures (method statements, pollution controls).	Not Significant following mitigation.
INNS	Construction	Risk of INNS spread during site clearance.	Medium-term	Embedded CEMP measures, including an Invasive Species Management Plan where required.	Not Significant following mitigation.

22.5 Climate Resilience and Adaptation

Table 22-4 – Summary of the Preliminary Assessment of Potential Significant Effects – Climate Resilience and Adaptation

Receptor / Resource	Sensitivity	Project Phase	Description of Potential Impact / Change	Duration	Mitigation Measures	Potential Significant Effect
Human Health (e.g. site workers)	High	Construction	Prolonged drought conditions leading to wildfire	N/A	Construction activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.
	High	Operation	High temperatures	N/A	Maintenance and repair activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Increased thermal impacts on operational workers may lead to overheating, increasing the risk of heat stress or heat exhaustion and potentially resulting in injury.
	Medium	Operation	Heavy rainfall / flooding	N/A	Maintenance and repair activities should not be undertaken during adverse climate conditions.	Heavy rainfall may lead to increased safety risks to operational workers as a result of localised flooding, potentially resulting in injury.
	Medium	Operation	Prolonged drought resulting in wildfire	N/A	Maintenance and repair activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.
	Medium	Decommissioning	High temperatures	N/A	Decommissioning activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Increased risk of heat exhaustion and heat stress for site workers, potentially resulting in injury.

Receptor / Resource	Sensitivity	Project Phase	Description of Potential Impact / Change	Duration	Mitigation Measures	Potential Significant Effect
	Medium	Decommissioning	Heavy rainfall / flooding	N/A	Decommissioning activities should not be undertaken during adverse climate conditions.	Heavy rainfall may lead to increased safety risks to site workers as a result of localised flooding, potentially resulting in injury.
	High	Decommissioning	Prolonged drought resulting in wildfire	N/A	Decommissioning activities should not be undertaken during adverse climate conditions and, where possible, work should be limited during high-risk seasons.	Prolonged dry conditions may lead to wildfire, potentially leading to injury or death.
Infrastructure (pipeline and AGIs)	Medium	Operation	High temperatures	N/A	Where possible, external shading (e.g. tree planting) should be implemented to reduce the risk of thermal gain. Landscaping designs should consider using drought-resistant vegetation to reduce die-back and improve soil stability, decreasing the risk of slope instability.	Potential overheating of AGIs resulting in structural damage and cracking/warping of fabric, requiring repairs.
	Medium	Operation	Heavy rainfall / flooding	N/A	Flood barriers, including temporary barriers such as sandbags, should be provisioned at AGIs. Emergency response plans should be developed and regularly tested to ensure that staff are equipped to address any pipeline damages that may arise from climate hazards swiftly and effectively.	Extreme precipitation may overwhelm drainage infrastructure, resulting in surface flooding and damage to AGIs. Saturation of soils may reduce ground stability, particularly when preceded by prolonged dry conditions, potentially resulting in landslides and damages to the pipeline and AGIs.
Infrastructure (e.g. access roads and pavements)	High	Operation	Heavy rainfall / flooding	N/A	Additional post-construction drainage should be installed where necessary to ensure that any existing drainage infrastructure impacted by the construction process remains operational.	Heavy precipitation may overwhelm drainage infrastructure and lead to surface flooding, blocking access to the pipeline and AGIs and preventing access for routine or emergency maintenance.
Landscape (e.g. hedgerows and planting)	Medium	Operation	High temperatures	N/A	Landscaping designs should consider using drought-resistant vegetation to reduce die-back and improve soil stability, decreasing the risk of slope instability arising from variable precipitation rates.	The landscape design may be compromised if vegetation is not resilient to increasing temperatures. This may in turn reduce soil stability, increasing the risk of ground movement and damages to the pipeline and AGIs.
	Medium	Operation	Drought	N/A	Landscaping designs should consider using drought-resistant vegetation to reduce die-back and improve soil stability, decreasing the risk of slope instability arising from variable precipitation rates.	The landscape design may be compromised if vegetation is not resilient to drought. This may in turn reduce soil stability, increasing the risk of ground movement and damages to the pipeline and AGIs.

22.6 Greenhouse Gases

Table 22-5 – Summary of the Preliminary Assessment of Potential Significant Effects – Greenhouse Gases

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
The global atmosphere	High	Construction	Release of emissions arising from material extraction and transportation to place of manufacture, manufacturing, transport of products to site, and construction installation. Significant GHG emissions are likely to arise from: Steel pipework: Estimated 32,381 tCO₂e arising from the upfront material emissions of the pipework, transport of the pipework to site and the construction waste management. Earthworks, including the excavation of material for the pipework Construction of support buildings Land use.	3.5 years (August 2028 – February 2032)	Construction emissions should be minimised through design optimisation and environmentally sensitive practices reflecting the Carbon Reduction Hierarchy. Prioritise use of more sustainable materials, products with reduced embodied emissions, and materials with higher proportion of recycled content.	The emissions arising from the pipework contribute 0.09% of the regional carbon budget during the construction period. This is not considered to be significant.
		Operation	Release of emissions arising from operational energy and water during the 25 year lifespan, including monitoring equipment, heating, lighting and pumping. Release of emissions arising from the maintenance, replacement, refurbishment and repair of the pipeline and associated infrastructure.	25 years	Operational emissions should be minimised by specifying long-lasting, high efficiency materials that require minimal maintenance and refurbishment, and using best practice in energy efficiency. Implementing a leak detection and maintenance programme will mitigate the release of unexpected emissions.	To be determined.
		Decommissioning	Release of emissions arising from decommissioning plant use, transportation of waste for disposal, and disposal of waste	To be determined	Maximising potential for reuse, recycling, and / or recovery of materials and elements at end-of-life through design, specification and dismantling practices. Prioritising local waste disposal facilities to minimise transportation distance.	To be determined.

22.7 Ground Conditions and Hydrogeology

Table 22-6 – Summary of the Preliminary Assessment of Potential Significant Effects – Ground Conditions and Hydrogeology

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Groundwater features within Study Area – water quality	Very High - SPZ1 (published), Public water supply. Very High or High - Principal aquifer. Medium – Secondary A and licensed agricultural; abstractions private water supplies, Low - Secondary B and Secondary Undifferentiated	Construction	During construction, there is the potential for existing contaminants to become disturbed / mobilised and migrate into groundwater features within the Study Area. Storage of construction materials / wastes in compounds areas and spillages of chemicals / fuels during construction could generate potentially contaminated run off which could impact groundwater features. For the SPZ1 this could require temporary stoppage of a public water supply.	Short to Medium Term	Embedded mitigation: GEO1 GEO2 GEO3 GEO4 GEO14 GEO6	Slight or Moderate
Groundwater features within Study Area – water quality	Very High - SPZ1 (published), Public water supply. Very High or High - Principal aquifer. Medium – Secondary A and licensed agricultural; abstractions private water supplies, Low - Secondary B and Secondary Undifferentiated	Construction	Pipeline construction using opencut trench methods providing a preferential pathway for construction related contamination	Short term / medium term	Embedded mitigation: GEO2 GEO3 GEO4 GEO14	Slight or Moderate
Groundwater features within Study Area – water quality	Very High – SPZ1 of public supply well	Construction	Below ground works causing turbidity in the groundwater that flows in a fracture dominated aquifer that feeds a public water supply well causing damage to the well and temporary loss of water supply.	Short Term / Medium Term	GEO14 Additional mitigation including consultation with Water Company and Environment Agency Foundations Risk Assessment.	Slight to Moderate
Groundwater features and connected surface water features within Study Area – water quality	Very High to Medium	Construction	Trenchless crossings methods creating a pathway for drilling fluids or other fluids used during construction to reach sensitive groundwater receptors or sensitive surface water receptors	Temporary	Embedded mitigation GEO14 Additional mitigation including a Frac-out plan.	Slight to Moderate
Groundwater features within Study Area – water quality	Very High – Principal and public water supply	Construction	Saline intrusion of aquifer caused by groundwater control (dewatering) causing lowered groundwater	Temporary / Permanent	Embedded mitigation GEO14	Slight to Moderate

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
			levels at the coastline of estuary or creation of pathways for saline water to enter the aquifer		Additional mitigation including a Hydrogeological Risk Assessment	
Groundwater features and connected surface water features within the Study Area – groundwater levels and flows	Very High to Medium	Construction	Groundwater control (dewatering) at the opencut trenches or trenchless method crossings causing groundwater lowering and loss of supply at nearby groundwater abstraction wells, reduced flow at springs, blow wells, and Chalk rivers, or reduced flow to groundwater supported features such as baseflow to watercourses, designated or non-designated surface water features and any GWDTEs.	Temporary	Embedded mitigation GEO14 Additional mitigation including a Hydrogeological Risk Assessment for each Trenchless Crossing	Slight to Moderate
Groundwater features within Study Area – water quality	SPZ1 – public supply well	Operation / Decommissioning	Contamination related potential impacts comprising pipeline leakage of fluid contaminant or accidental release of contaminants as part of operation or decommissioning of pipeline and infrastructure	Short Term / Medium Term	Embedded mitigation GEO11 GEO15 Additional mitigation including a risk assessment of water supplies. Consultation with Water Company and Environment Agency. Monitoring and Maintenance Plan	No Change to Moderate
Groundwater features within Study Area – water quality	SPZ1 – public supply well	Decommissioning	Retained pipeline becoming a future conduit of pollution due to deterioration and a future contamination incident, causing groundwater contamination.	Short Term / Medium Term	GEO13 Additional mitigation including a risk assessment of water supplies. Consultation with Water Company and Environment Agency	No Change to Moderate
Dimlington Cliffs SSSI	Very High	Construction / Decommissioning	Disturbance / potential partial loss of geological SSSIs	Permanent	Embedded mitigation GEO7 GEO11 GEO14 GEO15 Additional mitigation including specific measures to reduce resource loss	Moderate

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
					Pipeline to be installed beneath Dimlington Cliffs utilising trenchless methods Beach monitoring Ongoing monitoring of cliff retreat and coastal erosion rates following construction Agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal zone	
Disturbance of protected features within the Holderness Inshore MCZ	Medium	Construction	Temporary disturbance of seabed habitats and geological features from construction activities Localised habitat loss within the MCZ.	Short-term	Embedded mitigation GEO11 Pipeline route optimisation in the nearshore will be conducted where reasonable practicable to minimise impacts on potential features of conservation interest Vibratory piling to be used over impact piling for the installation of the cofferdam CEMP developed and adhered to. Agreement on the requirements in the nearshore at Easington will be reached with consultees for any post-installation surveys in the intertidal	Moderate
Thermal impacts arising from the pipeline being pressurised with dense-phase CO ₂	TDC	Operation	Heat transfer from the pressurised pipeline to surrounding sediments may alter sediment temperature profiles, potentially influencing sediment cohesion, moisture content, or erosion rates in the intertidal zone	Long-term	To be determined	To be determined

22.8 Cultural Heritage

Table 22-7 – Summary of the Preliminary Assessment of Potential Significant Effects – Cultural Heritage

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Scurff Hall moated site (SM3)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Adlingfleet Conservation Area (CA3)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Moat, Long Drax (9)	High	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Geophysical remains of a possible trackway (12)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Fishpond south of Drax Abbey Farm (14)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Possible enclosure of moated site, Drax (19)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
St Wilfreds (59)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Hawday Lane (66)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Iron Age / Roman features South of Halfway Houses, Newland (70)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Roman Enclosures Underlying A Medieval Boundary (77)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Possible Extraction Ditches / Pits (106)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Cropmarks, West Ings (131)	High	Construction	Direct physical contact	Permanent	Preservation by record	Moderate Adverse
Decoy house (site of) (167)	Low	Construction	Direct physical contact	Permanent	Preservation by record	Moderate Adverse
Site of Bracken Hill Cross (169)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Warping drain (site of) Keadby Common (170)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Adlingfleet Med / pm Settlement and Smv (194)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse
Possible Prehistoric or Romano-British settlement (1821)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Possible Prehistoric or Romano-British Settlement (1822)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Thornton Abbey Augustinian monastery: gatehouse, precinct, medieval road and bridge, moat, fishponds, post-Dissolution college and school, and house (SM14)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Roman villa immediately west of Horkstow Hall (SM7)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Medieval Settlement of Croxton (SM12)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Yarborough Camp large univallate hillfort (SM10)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
North Garth moated site and associated enclosures (SM18)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary & Permanent	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect and the permanent loss of contemporaneous assets will result in a permanent significant effect.
Thornton Abbey Gatehouse and Wing Walls, Precinct Walls and Barbican (LB88)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Manor Farmhouse (LB98)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Remains of Thornton Abbey Church and Adjoining Monastic Ranges (LB93)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Church of St Peter (LB97)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Long barrow, two Neolithic mortuary enclosures and adjacent round barrow (SM8)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Howe Hill Bowl Barrow (SM9)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Second World War QF bombing decoy (SM15)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Chapel Farmhouse (LB69)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Barton Lodge (LB71)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Farmhouse and Barn at Barton Field Farm (LB70)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Glebe Farmhouse (LB51)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Hall Farm Cottages (LB64)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Former St James' Hospital (805), Thornton Abbey and Precinct (832), Thornton Abbey fishponds (836), Possible Fishponds north of Thornton Abbey (796)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Haythby Deserted Medieval Village (244), Late Prehistoric Cropmark Complex (272, 278, 341, 377), Possible Ladder Settlement (309), Romano-British settlement (485, 636), 'Blow Field' Moated site (1178), Prehistoric settlement (1848)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major Adverse
Romano-British settlement cropmarks (350, 353, 359), Thornton Curtis Settlement earthworks (684), North Killingholme settlement earthworks (1124)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate Adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Hall Farm Horkstow (492), Former stable block Horkstow Hall (491) (575)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Barton Lodge Landscape Garden (565), Croxton Medieval / Post-Medieval settlement (682), Holtham Deserted Medieval Village (1175)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Excavated Romano-British Settlement (575)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Thornton Abbey Augustinian monastery: gatehouse, precinct, medieval road and bridge, moat, fishponds, post-Dissolution college and school, and house (SM14)	High	Operation	Change in setting which adversely affects the heritage value of the asset	Permanent	Embedded mitigation of landscape planting will act to reduce the visual impact of the AGI in the setting of the asset	Moderate adverse – The AGI planting scheme will reduce views towards the AGI, but the permanent access road will cause traffic noise, disrupting the rural setting and resulting in a permanent significant effect.
Paull Holme Moated Site & Tower (SM23)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting and disruption of wider views from the asset will still result in a temporary significant effect.
Winestead Manor moated site (SM23)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Winestead Conservation Area (CA5)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Paull Holme Tower (LB112)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Major adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting and disruption of wider views from

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
						the asset will still result in a temporary significant effect.
Church of St Germain (LB121)	High	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
The Hall (LB113)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Dimlington Stadial Deposits at the Easington Landfall (1854)	High	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Rectilinear Field System (1706), Ring Ditches, Numbers (1710), Linear Ditches, North of Whin Hill (1714), Rectangular Enclosures, Winestead Carrs (1715), Cropmarks, North Field 1754)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
St Mary Magdalene's Leper Hospital & Moat, W Of Newton Garth (1526), Medieval Leper Hospital and Moat, Newton Garth, Paull (1530)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Decoy, S of Paull Holme (1581), Second World War Bombing Decoy Site, Paull (1595), Second World War Bombing Decoy Site, Paull (1599)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Shrunken Medieval Village, Ridge and Furrow (1584), Paull Holme Med / pm Settlement & SMV (1588)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Site of Old Park, Winestead (1701)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting will still result in a temporary significant effect.
Rectangular And Circular Cropmarks, Patrington (1741), Double-ditched Feature & Other Cm, S Of Ring Of Bright Water (1742)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Cropmarks (1769)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Moated Site and Fishpond, Rysome Garth (1778)	Medium	Construction	Change in setting which adversely affects the heritage value of the asset	Temporary	Standard construction mitigation measures	Moderate adverse – standard construction mitigation may reduce some of the impact although the temporary loss of the rural setting and removal of agricultural hinterland within the wider setting will still result in a temporary significant effect.
Probably later prehistoric enclosures and field system (1836)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Probably later prehistoric features (1837)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Linear and curvilinear features, and ring ditches (1842)	Medium	Construction	Direct physical impact	Permanent	Preservation by record	Major adverse
Second World War Bomb Crater, Paull (1386), Second World War Bomb Crater, Paull (1451)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Historic Ridge And Furrow, Newton Garth, Paull (1473), Historic Ridge And Furrow, Lakes Farm, Paull (1545), Historic Ridge and Furrow, Boreas Hill Farm, Paull (1575), Historic Field Boundaries, Cow Hill, Paull (1578), Historic Ridge and Furrow, Boreas Hill Farm, Paull (1586), Possible Historic Field Boundaries And Drainage Ditches; Settlement?, Paull Holme Paull (1596), Possible Historic Drainage Ditches, Auster Grange, Paull (1603), Medieval Broad Ridge and Furrow, Paul Holme, Paull (1607)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Site Of Aircraft Obstruction (1538), World War II Anti Landing Obstruction, Paull Holme Outstray, Paull (1554), Wwii Decoy (1597), Second World War Bombing Decoy Site, Paull Holme, Paull (1598), Site Of Decoy, Se Of Paull Holme (1599), Second World War Bomb Craters, Paull Holme, Paull (1600), Second World War Bomb Crater, Little Humber, Paull (1601), Possible Historic Drainage Ditches, Auster Grange, Paull (1603), Possible Second World War Bomb Crater, Little	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Humber, Paull (1613), Possible Second World War Bomb Crater, Little Humber, Paull (1615), Possible Second World War Bomb Crater, Auster Grange, Paull (1618), Possible Second World War Bomb Craters, Little Humber, Paull (1628), Possible World War I Anti-landing Obstacle, Thorn Marsh Farm, Thorngumbald (1631)						
Paull Holme Shrunk Medieval Village activity Possible Historic Drainage Ditches, Paull Holme, Paull (1540), Historic Ridge And Furrow, Newton Garth, Paull (1548), Probable Post Medieval Drainage Ditches, Paull Holme Outstray, Paull (1549), Possible Historic Drainage Ditch, Paull Holme, Paull (1552), Medieval Broad Ridge And Furrow, Paul Holme, Paull (1560), Well At Paull Holme Farm (1562), Possible Historic Field Boundaries, Paull Holme, Paull (1580), Possible Historic Field Boundary, Paull Holme, Paull (1582), Historic Drainage Ditches, Settlement, Paull Holme, Paull (1583), Post Medieval To Early Twentieth Century Land Improvement Drain, Thorney Crofts, Thorngumbald (1635)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible Post Medieval Sea Defences, Paull Holme Outstray, Paull (1565)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Paull Holme Farmhouse (1566)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible Pit Alignment, North West of Boreas Hill (1570)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Post Medieval Gravel Hill, South Hill, Paull (1602), Historic Field Boundaries, Little Humber, Paull (1611), Possible Historic Pond And Trackway, Thorn Marsh Farm, Thorngumbald 1627)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Site of Direction Finder Station (1634)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Ryhill Marsh Enclosure (1638)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Disused Field Boundaries with Corner Fold (1666)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
?round Barrows, N of Ings Lane (1700)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible Prehistoric Occupation (1702)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Prehistoric to Medieval Features and Finds (1712)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Rectilinear Enclosures, Linear Features And Field Boundaries (1771)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible Cropmarks (1824)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Additional Field Boundary (1826)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Control Room Bunker (1827)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Former field drain (1831)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible prehistoric features (1838)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Possible prehistoric enclosures (1839)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Ring ditch and possible trackway (1843)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Ring ditch and linear features (1846)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse
Linear and Curvilinear Features (1840)	Low	Construction	Direct physical impact	Permanent	Preservation by record	Moderate adverse

22.9 Landscape and Visual

22.9.1 The preliminary assessment of potential significant effects associated with the Project has concluded there will be no significant effects in relation to Landscape and Visual.

22.10 Noise and Vibration

Table 22-8 – Summary of the Preliminary Assessment of Potential Significant Effects – Noise and Vibration

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Occupants of residential properties	High	Operation	Noise levels generated by the operation of the Pump Facility resulting in potential disturbance or interference with activities.	Long term	To be determined and reported in the	Uncertain. However, unlikely to be significant. To be reported in the ES

22.11 Socio-economics, Tourism and Recreation

Table 22-9 – Summary of the Preliminary Assessment of Potential Significant Effects – Socio-economics, Tourism and Recreation

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Commercial Business	High	Construction	A potential temporary construction compound is proposed at the A1033 where the draft Order Limits cross between Patrington and Winestead. This compound is located within the outdoor storage space of a local business. To be assessed further during preparation of ES.	Temporary	Ongoing engagement will take place with affected land and property owners in relation to potential impacts and appropriate mitigation measures identified.	Moderate Significant Effect

22.12 Human Health and Wellbeing

22.12.1 The preliminary assessment of potential significant effects associated with the Project has concluded there will be no significant effects in relation to Human Health and Wellbeing.

22.13 Traffic and Transport

Table 22-10 – Summary of the Preliminary Assessment of Potential Significant Effects – Traffic and Transport

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Pedestrians	High	Construction	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances where temporary closures or diversion of footways or PRow are proposed. Fear and intimidation due to increase in traffic and HGV - Loss of amenity	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Cyclists	High	Construction	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances - Fear and intimidation - Loss of amenity	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Horse-Riders	High	Construction	- Severance through a reduced ability to cross the road - Reduction in road safety - Changed journey times and distances where temporary closures or diversion of footways or PRow are proposed. Fear and intimidation due to increase in traffic and HGV - Loss of amenity	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Bus Passengers	Low	Construction	- User delay through increased journey times - Reduction in road safety	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Car drivers / passengers	Low	Construction	- Delay through increased journey times - Reduction in road safety	Temporary	Appropriate mitigation measures will be detailed in the ES and Outline CTMP.	An assessment will be undertaken in the ES for each of the Construction Access Routes which exceed the traffic increase threshold.
Marine traffic	Medium	Construction	There is potential for the physical presence of vessels associated with Project construction to obstruct other sea users, i.e., marine traffic. However, the industry as a whole is tolerable to a degree of displacement. Whilst it is appreciated installation activities may cause a degree of disturbance to marine traffic in the Humber (due to prominent port locations), vessels (i.e., tanker) operating in the area will be experienced in navigating around installation vessels; with passenger vehicles aware and prepared to navigate clear of any additional vessels	Short-term	NA	Slight

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
			associated with installation. Any displacement will therefore be highly localised and occur over short durations. Impacts at Easington Landfall are considered to be limited considering low vessel densities which overlap with the draft Order Limits.			

22.14 Waste and Materials

Table 22-11 – Summary of the Preliminary Assessment of Potential Significant Effects – Waste and Materials

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Material Resources	Low	Construction	Material resources required by the Project could potentially reduce regional material stocks.	Long term	Preparation of a SWMP. Implementation of procurement practices to order materials when required	Potential significant effects will be detailed within the ES.
Mineral resources (Safeguarded Areas)	Very High	Construction	Safeguarded mineral resources intersected by the draft Order Limits have the potential to be sterilised.	Long term	Preparation of an MMP	Potential significant effects will be detailed within the ES.
Landfill void capacity: inert/non-hazardous	Very high	Construction	Inert waste generated by the Project is considered to be negligible when compared to current landfill void capacity and forecast trends.	Long term	Preparation of a SWMP. Preparation of an MMP	Potential significant effects will be detailed within the ES.
Landfill void capacity	Very high	Construction	Non-inert waste generated by the Project through to completion is considered to be negligible when compared to current landfill void capacity.	Long term	Preparation of a SWMP.	Potential significant effects will be detailed within the ES.

22.15 Hydrology and Land Drainage

Table 22-12 – Summary of the Preliminary Assessment of Potential Significant Effect – Hydrology and Land Drainage

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Coastal waters: water quality	Very high / high	Construction		Temporary	W17	Moderate

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Main rivers: water quality	High / medium		Temporary effects at watercourse crossings and construction works sites, for example, due to the generation of silted runoff and associated with over-pumping and dewatering activities. There is also limited potential for break out of drilling muds at trenchless crossings.			
Ordinary watercourses: water quality						
Main rivers: flood flow storage and conveyance	Very high / high	Construction	Fluvial flood risk impacts to Project construction work sites.	Temporary	W06 W07 W08 W14	Moderate
Ordinary watercourses with mapped areas of Flood Zone 2/3: flood flow storage and conveyance						
Land drainage regime: flood flow storage and conveyance	Medium	Construction	The existing land drainage regime could be impacted through construction works, damage to soil structure and construction of AGIs on greenfield land.	Temporary	W06 W07 W08 W14	Moderate
Main rivers: flood flow storage and conveyance	Very high	Operation	Fluvial flood risk impacts on AGIs in Flood Zone 3.	Permanent	W01 W03 W06 W07 W08 W14	Moderate
People and existing development within the floodplain: flood risk	Medium to Very High (depending on type of development)	Decommissioning	Flood risk impacts	Temporary	W19	Moderate

22.16 Major Accidents and Disasters

22.16.1 The preliminary assessment of potential significant effects associated with the Project has concluded there will be no significant effects in relation to MA&D.

22.17 Coastal Processes

Table 22-13 – Summary of the preliminary assessment of potential significant effects: Coastal Processes

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Disturbance of Dimlington Cliff SSSI and associated disruption to natural erosion consequent of beach works	Medium	Construction	Potential for localised cliff erosion due to altered hydrodynamics and wave energy and changes in rates of erosion during construction and following reinstatement	Short-medium term	Beach monitoring and management plan of erosion rates, cliff retreat and beach profile Ongoing monitoring of cliff retreat and coastal erosion rates following construction Agreement on the requirements in the nearshore at Easington will be reached with consultees including the Shoreline Management team at EROy for any post-installation surveys in the intertidal	Moderate

22.18 Cumulative and In-Combination Effects

Table 22-14 – Summary of the Preliminary Assessment of Potential Significant Effects – Cumulative and In-Combination Effects

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
PRoW (including users of)	Low	Construction, Operation and Decommissioning	Potential human health and visual impacts as a result of construction and AGI locations.	Construction, Operation and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP	Unlikely to be significant following the implementation of agreed mitigation measures
Designated Biodiversity Sites (non-HRA sites)	Medium to high	Construction and Decommissioning	Potential ecology, soils and hydrology impacts as a result of. Land take i.e. habitat loss, fragmentation and reduction / loss of IEF quality or function, disturbance / harm / mortality of associated species; and soil compaction / loss Pollution risk – direct and indirect impact to habitat, species, soils and water supplies from construction pollution. Changes in water and sediment. Soil contamination from construction and decommissioning	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP	Potential for significant – this will be confirmed following the development of mitigation, enhancement and / or compensation measures (where required).

Receptor / resource	Sensitivity	Project phase	Description of potential impact / change	Duration	Mitigation Measures	Potential significant effect
Residents of residential properties	Medium	Construction and Decommissioning.	Potential traffic and transport, human health, air quality and landscape and visual impacts due to construction activities. Potential impact to receptors during decommissioning due to dismantling of AGIs and Pump facilities.	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP	Unlikely to be significant following the implementation of agreed mitigation measures
Local businesses	Low	Construction and Decommissioning	Potential traffic and transport, human health, air quality and landscape and visual impacts due to construction activities. Potential impact to receptors during decommissioning due to dismantling of AGIs and Pump facilities.	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP.	Unlikely to be significant following the implementation of agreed mitigation measures
Community facilities	Low	Construction and Decommissioning	Potential traffic and transport, human health, air quality and landscape and visual impacts due to construction activities. Potential impact to receptors during decommissioning due to dismantling of AGIs and Pump facilities.	Construction and Decommissioning	For construction (and assumed decommissioning) phase embedded measures as outlined in the draft CEMP	Unlikely to be significant following the implementation of agreed mitigation measures

22.19 Next Steps

- 22.19.1 Following statutory consultation, the preliminary design will be developed further, addressing comments received throughout the consultation. The Environmental Statement (ES) will present the assessment of the updated design.
- 22.19.2 The Register of Commitments has been developed as part of the PEIR and will outline the Project commitments.
- 22.19.3 Mitigation measures will be incorporated into the design of the Project, and all assessments have informed the design. Remaining baseline surveys will be undertaken and reported in the ES.

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Humber
Carbon Capture
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