



H2NorthEast Project



Volume I: Environmental Impact Assessment Scoping Report (Main Report)

Synopsis:

The Planning Act 2008

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Regulations – Regulation 10 (Application for a Scoping Opinion)

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Revision	Issue Date	By	Checked	Description
1.0	10/02/25	Arup	H2NorthEast Limited	Issue

Abbreviations

Abbreviations	Definitions
the 2008 Act	The Planning Act 2008
AA	Appropriate Assessment
AADT	annual average daily traffic
Advice Note 7	Environmental Impact Assessment: Preliminary Environmental Information and Environmental Statements
AEL	achievable emission level
AEP	annual exceedance probability
AGI	above ground installation
AGL	above ground level
AIL	abnormal indivisible load
ALARP	as low as reasonably practicable
ALC	Agricultural Land Classification
AOD	above ordnance datum
AONB	Area of Outstanding Natural Beauty
APFP Regulations	Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations
APIS	Air Pollution Information System
the Applicant	H2NorthEast Limited
the Application	DCO form, content and accompanying documents
Application for EIA Scoping Opinion	Regulation 10 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
AQMA	Air Quality Management Area
AQMAU	Air Quality Management and Assessment Unit
Arup	Ove Arup & Partners Limited
ASNW	ancient and semi-natural woodland
Associated Development	Aspects of the Proposed Development beyond the HPF and Hydrogen Pipeline(s) that are not automatically considered as an NSIP but are to be considered as development for which development consent is required.

Abbreviations	Definitions
ASR	annual status report
ASU	air separation unit
ATR	auto-thermal reformer
BAP	biodiversity action plan
BAT	Best Available Techniques
BESS	Battery energy storage system
BGS	British Geological Survey
BMV	best and most versatile
BNG	biodiversity net gain
BoCC	Birds of Conservation Concern
BPM	Best Practicable Means
BREF	Best Available Techniques reference document
BRES	Business Register and Employment Survey
BS	British Standard
BTO	British Trust for Ornithology
CAA	Civil Aviation Authority
CATS	Central Area Transmission System
CBC	Common Bird Census
CCP	carbon capture plant
CCR	carbon capture readiness
CCR	climate change resilience
CCRA	climate change risk assessment
CCS	carbon capture and storage
CCUS	carbon capture use and storage
CDM	Construction Design and Management
CDOIF	Chemicals and Downstream Oil Industries Forum

Abbreviations	Definitions
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CFMP	catchment flood management plan
CH ₄	methane
CIBSE	Chartered Institution of Building Services Engineers
CIEEM	Chartered Institute of Ecology and Environmental Management
CiFA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research Information Association
CITES	The 'Washington' Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNP	critical national priority
CO	carbon monoxide
CO ₂	carbon dioxide
COMAH	Control of Major Accident Hazards
COPA	Control of Pollution Act 1974
COSHH	Control of Substances Hazardous to Health
CRR	Community Risk Register
CRTN	Calculation of Road Traffic Noise
CSO	combined sewer overflow
CTMP	construction traffic management plan
CWTP	construction workers' travel plan
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
DM	do-minimum
DML	deemed marine licence

Abbreviations	Definitions
DMRB	Design Manual for Roads and Bridges
DNO	distribution network operator
DPD	development plan documents
DS	do-something
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
DSM	digital surface model
DTM	digital terrain model
DWPA	drinking water protected area
DWSZ	drinking water safeguard zone
EcIA	ecological impact assessment
ECC	East Coast Cluster
eDNA	environmental DNA
EEA	European Economic Area
EHO	environmental health office(r)
EIA	environmental impact assessment
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
ELV	emission limit value
EMODnet	European marine observation data network
EMS	environmental management system
EnvCoW	Environmental Clerk of Works
EPR	Environmental Permitting Regulations
EPS	European Protected Species
EQS	Environmental Quality Standard
ERIC NE	Environmental Records Information Centre for the Northeast of England
ES	Environmental Statement

Abbreviations	Definitions
EU	European Union
EUNIS	European University Information Systems
FAS	flood alleviation scheme
FEED	front end engineering design
FRA	flood risk assessment
FTE	full-time equivalent
GCN	great crested newt
GHG	greenhouse gas
GHR	gas heated reformer
GI	ground investigation
GLTA	ground level tree assessment
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, third edition
GPA	Good Practice Advice
GPP	guidance for pollution prevention
GVA	gross value added
GW	gigawatt
GWth	gigawatt thermal
GWDTE	groundwater dependent terrestrial ecosystem
H ₂	hydrogen gas
H ₂ S	hydrogen sulphide
ha	hectares
Habitats Regulations	Conservation of Habitats and Species Regulations 2017
HAZID	hazard identification
HAZOP	hazard and operability study
HBC	Hartlepool Borough Council
HDD	horizontal directional drilling

Abbreviations	Definitions
HDV	heavy duty vehicle
HER	historic environment record
HFC	hydrofluorocarbon
HGV	heavy goods vehicle
HHV	higher heating value
HMSO	Her Majesty's Stationery Office
HPF	hydrogen production facility
HPMA	highly protected marine areas
HRA	Habitat Regulations Assessment
HSE	Health and Safety Executive
HSI	habitat suitability index
HSWA	Health and Safety at Work etc. Act
Hydrogen Pipeline(s)	hydrogen distribution pipelines that comprise part of the Proposed Development
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
ICCI	in-combination climate change impact
ICE	Inventory of Carbon and Energy Database
ICES	International Council for the Exploration of the Sea
IED	Industrial Emissions Directive
IEMA	Institute of Environmental Management and Assessment
IHBC	Institute of Historic Building Conservation
IHLS	International Herring Larvae Surveys
IMD	index of multiple deprivation
INCA	Industry Nature Conservation Association
INNS	invasive non-native species

Abbreviations	Definitions
ISO	International Standards Organisation
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LAA	local aggregate assessment
LBAP	local biodiversity action plan
LBMEP	landscape and biodiversity management and enhancement plan
LCA	Landscape Character Area
LCP	large combustion plant
LCRM	land contamination risk management
LDV	light duty vehicle
LGV	light goods vehicle
LLFA	lead local flood authority
LNR	Local Nature Reserve
LPA	local planning authority
LSE	likely significant effect(s)
LSOA	lower super output area
LVIA	landscape visual impact assessment
LWS	Local Wildlife Site
MA&D	major accidents and disasters
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside
MAH	major accident hazard
MAPP	major accident prevention plan
MBT	microbore tunnel
MCA	Marine Character Area

Abbreviations	Definitions
MCAA	Marine and Coastal Access Act
MCP	medium combustion plant
MCZ	Marine Conservation Zone
MHCLG	Ministry of Housing, Communities & Local Government
MHWS	mean high-water spring
MID	method of implementation document
ML	marine licence
MMO	Marine Management Organisation
MMP	materials management plan
MOP	maximum operating pressure
MPS	marine policy statement
MSA	mineral safeguarding area
MtCO ₂	million tonnes of carbon dioxide
MtCO ₂ e	million tonnes of carbon dioxide equivalent
MW	megawatt
MWth	megawatt thermal
N ₂	nitrogen
N ₂ O	nitrous oxide
NBN	National Biodiversity Network
NCA	National Character Area
NCN	National Cycle Network
NEP	Northern Endurance Partnership
NERC	Natural Environment and Rural Communities Act 2006
NF ₃	nitrogen trifluoride
NH ₃	ammonia
NHLE	National Heritage List for England

Abbreviations	Definitions
NIA	Noise Important Area(s)
NMU	non-motorised user(s)
NNG	Night Noise Guidelines
NNR	National Nature Reserve
NO ₂	nitrogen dioxide
NO _x	oxides of nitrogen
NPG	Northern Powergrid
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NRMM	non-road mobile machinery
NRR	National Risk Register
NSIP	Nationally Significant Infrastructure Project
NSR	noise sensitive receptor
NSRI	National Soil Resources Institute
NTS	National Transmission System
NTS	non-technical summary
NVC	National Vegetation Classification
NVZ	nitrate vulnerable zones
NWL	Northumbrian Water Limited
NZT	Net Zero Teesside
O&M	operation and maintenance
O ₂	oxygen
OD	Ordnance Datum
OGV	other goods vehicle

Abbreviations	Definitions
OMH	open mosaic habitat
ONR	Office of Nuclear Regulation
ONS	Office for National Statistics
ORVal	Outdoor Recreation Valuation Tool
OS	Ordnance Survey
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PC	process contribution
PEA	preliminary ecological appraisal
PEC	predicted environmental concentration
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
PIA	personal injury accident
PINS	Planning Inspectorate
PM ₁₀	particulate matter of 10 micrometres (µm) diameter or less
PM _{2.5}	particulate matter of 2.5 micrometres (µm) diameter or less
PPG	Planning Practice Guidance
PRA	preliminary roost assessment
PRF	potential roost feature
the Proposed Development Site	The land at Seal Sands, in Stockton-on-Tees and Redcar and Cleveland, Teesside
PRoW	public right(s) of way
PSA	pressure swing adsorption
PSR	Pipeline Safety Regulations
PWS	private water supplies
RBMP	river basin management plan
RCBC	Redcar and Cleveland Borough Council

Abbreviations	Definitions
RCP	representative concentration pathways
RICS	Royal Institution of Chartered Surveyors
RSPB	Royal Society for the Protection of Birds
SAC	Special Area(s) of Conservation
SBC	Stockton-on-Tees Borough Council
SCR	selective catalytic reduction
SF ₆	sulphur hexafluoride
SFRA	strategic flood risk assessment
SLM	sound level meter
SMR	small modular reactor
SMRU	Sea Mammal Research Unit
SNCI	Site of Nature Conservation Importance
SoPI	Species of Principle Importance
SoS	Secretary of State
SO _x	sulphur dioxide
SPA	Special Protection Area
SPD	supplementary planning documents
SPG	supplementary planning guidance
SPL _{RMS}	sound pressure level root mean square
SPMP	site protection and monitoring programme
SPZ	source protection zone
SRFA	strategic flood risk assessment
SRN	strategic road network
SSSI	Site of Special Scientific Interest
STW	sewage treatment works
SWMP	site waste management plan

Abbreviations	Definitions
TA	transport assessment
T&S	transportation and storage
T&T	traffic and transport
TCO ₂ e	tonnes of carbon dioxide equivalent
TET	Teesside Environmental Trust
TGPP	Teesside Gas Processing Plant
ToLSE	test of likely significant effects
TraC	transitional and coastal waters
Track 1	The first two clusters identified by Department for Energy Security and Net Zero sequenced for deployment in the UK by the mid-2020s
TTWA	Travel to Work Area
TVCA	Tees Valley Combined Authority
UKCP18	United Kingdom Climate Projections 2018
UKHab	United Kingdom Habitat Classification
UNFCCC	United Nations Framework Convention on Climate Change
UXB	unexploded bombs
UXO	unexploded ordnance
VP	vantage point
WCA	Wildlife and Countryside Act
WeBS	wetland bird survey
WEEE	waste electrical and electronic equipment
WFD	Waste Framework Directive
WFD	Water Framework Directive
WHO	World Health Organisation
ZoI	zone of influence
ZTV	zone of theoretical visibility

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1 Introduction

1.1 Background

1.1.1 H2NorthEast Limited ('the Applicant'), a joint venture between Kellas Hydrogen Limited ('Kellas') and SSE Hydrogen Holdings Limited ('SSE'), has appointed Ove Arup & Partners Limited ('Arup') to prepare this environmental impact assessment (EIA) Scoping Report to support an application for an EIA Scoping Opinion under Regulation 10 ('Application for EIA Scoping Opinion') of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations')¹. The EIA Scoping Opinion is sought to inform the scope and content of an EIA for the construction, operation (including maintenance where relevant) and eventual decommissioning of a carbon capture and storage (CCS) enabled blue hydrogen production facility (HPF) with up to approximately 1 gigawatt thermal (GWth) hydrogen production capacity and hydrogen distribution pipeline network on land at Seal Sands, in Stockton-on-Tees and Redcar and Cleveland, Teesside ('the Proposed Development Site').

1.2 Project Overview

1.2.1 The Proposed Development Site is located within the administrative boundaries of Stockton-on-Tees Borough Council (SBC) and Redcar and Cleveland Borough Council (RCBC) and aims to support industrial decarbonisation across Teesside by providing a source of low carbon hydrogen to local industry. To meet the UK's sixth Carbon Budget, the Government outlined its ambition to capture 20 – 30 million tonnes of carbon dioxide (MtCO₂) per year by 2030 through deployment of four carbon capture use and storage (CCUS) clusters. The first two CCUS clusters have been selected by the Department for Energy Security and Net Zero (DESNZ) as 'Track 1' clusters, sequenced for deployment in the UK by the mid-2020s. The East Coast Cluster (ECC) includes the Net Zero Teesside (NZE) CO₂ Pipeline Project that the Proposed Development intends to discharge captured CO₂ into. The Proposed Development will help to safeguard existing industries and jobs, deliver economic growth on Teesside and provide domestically produced low carbon hydrogen needed to support the decarbonisation of local industrial users and wider UK net zero targets.

1.2.2 The Proposed Development comprises a HPF adjacent to the existing

¹ UK Government (2017) The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Central Area Transmission System (CATS) Gas Terminal on Seal Sands, Teesside owned (and operated) by the Kellas group through a joint venture known as CATS North Sea Limited. The existing CATS Terminal processes over a quarter of all UK domestic gas production, offering synergies with the Proposed Development.

- 1.2.3 In addition to the HPF, which will be located adjacent to and partially within the existing CATS Terminal, the Proposed Development comprises a CO₂ export connection for the purposes of CCS, and hydrogen distribution pipelines 'the Hydrogen Pipeline(s)' stretching from Cowpen Bewley in the west to Wilton in the east. The HPF, Hydrogen Pipelines, CO₂ export, natural gas, electricity, water, wastewater and effluent pipelines, oxygen (O₂) and nitrogen (N₂) import connections and associated infrastructure required for the facility to operate, are herein referred to as the 'Proposed Development'.
- 1.2.4 The Proposed Development is subject to ongoing technical studies; however, it is anticipated that the HPF will be developed with a design capacity of up to approximately 1GWth across two phases ('Phase 1' and ('Phase 2')) and will consist of up to three trains². Each train will have a production capacity ranging from approximately 355 megawatts (MW) to 710MW higher heating value (HHV) and each train would therefore have the ability to capture approximately 650,000 – 1,300,000 tonnes of CO₂ per annum. Once fully developed, the Proposed Development could contribute up to 10% of the UK's target H₂ capacity and capture approximately two million tonnes of CO₂ per annum.
- 1.2.5 The Proposed Development Site under consideration is shown on Figure 1.1 and Figure 1.2 (aerial base) (Appendix A – Volume II) and is reproduced as Picture 1.1 below.

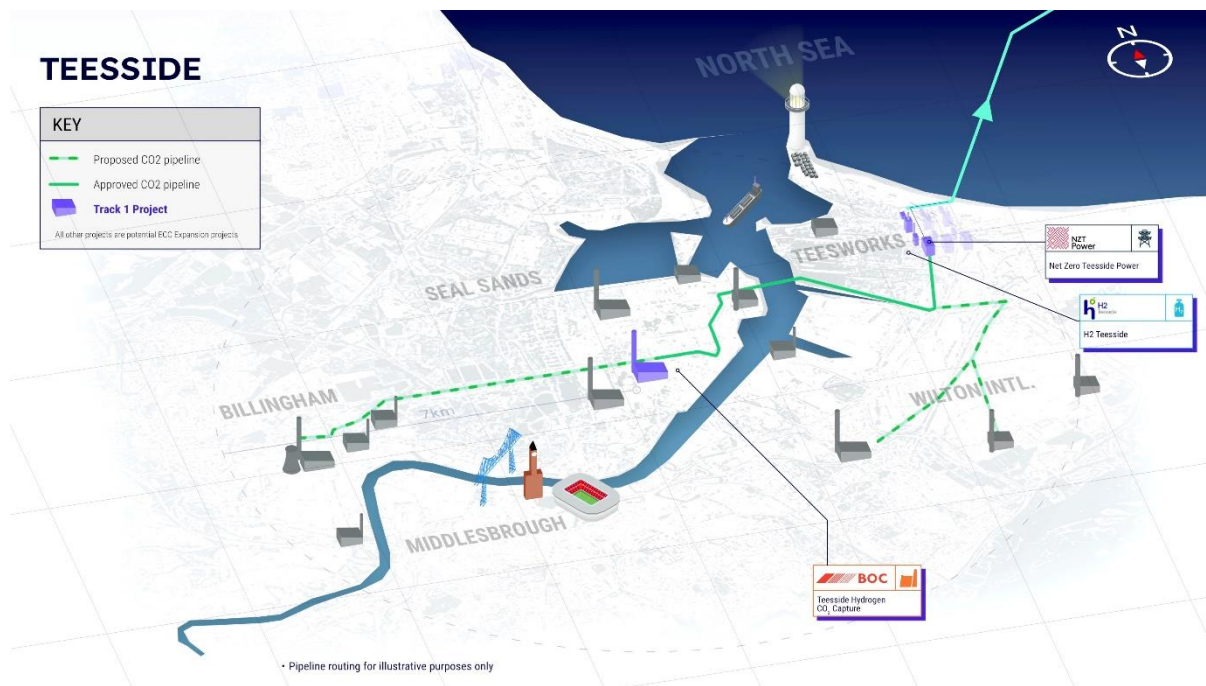
² Each HPF unit, and associated carbon capture plant (CCP) is referred to as a 'train' in this report.

Picture 1.1: The Proposed Development Site

- 1.2.6 The HPF will produce low carbon hydrogen which is compliant with the UK Government's Low Carbon Hydrogen Standard³ which defines what constitutes 'low carbon hydrogen' up to the point of production. The intent of the standard is to ensure new low carbon hydrogen production supported by government makes a direct contribution to the UK's greenhouse gas (GHG) emissions reduction targets.
- 1.2.7 The Proposed Development will form part of the wider ECC project that includes the Northern Endurance Partnership (NEP); the CO₂ transportation and storage (T&S) network which will deliver the infrastructure to capture CO₂ from a range of emitters across Teesside and transport it offshore for permanent storage underground in the Southern North Sea. This is illustrated schematically in Picture 1.2 below.

³ Department for Energy Security and Net Zero (2023) UK Low Carbon Hydrogen Standard: Greenhouse Gas Emissions Methodology and Conditions of Standard Compliance. Available at: <https://assets.publishing.service.gov.uk/media/6584407fed3c3400133bfd47/uk-low-carbon-hydrogen-standard-v3-december-2023.pdf> [Accessed 24/01/2025].

Picture 1.2: Schematic Illustration of the Northern Endurance Partnership CO₂ Pipeline, Teesside (source: NEP website)



1.3 Consenting Regime

Development Consent Order

- 1.3.1 Section 14 of the Planning Act 2008⁴ ('the 2008 Act') defines the types of development that constitute a Nationally Significant Infrastructure Project (NSIP) and therefore require development consent under Section 31 of the 2008 Act.
- 1.3.2 Phase 2 of the Proposed Development may include a generating station with a capacity of > 50MW which itself constitutes an NSIP under the 2008 Act. The Hydrogen Pipeline(s) may also constitute an NSIP under Section 14(g) of the 2008 Act (i.e. the construction of a pipeline other than by a gas transporter whose length exceeds 16.093 km). However, as the final length of the Hydrogen Pipeline(s) is currently uncertain (and will vary depending on several factors), the Applicant has sought direction under Section 35 of the 2008 Act from the Secretary of State (SoS) on whether the HPF and Hydrogen Pipeline(s) should be treated as development for which development consent is required. The SoS issued a direction on 22 November 2024 that the HPF and any aspect of the Hydrogen Pipeline(s) that are not automatically an NSIP are to be treated as development for which development consent is required. The other aspects of the Proposed Development are being brought forward as 'Associated Development' to the

⁴ UK Government (2008) Planning Act 2008.

NSIP development.

Environmental Impact Assessment

- 1.3.3 As an NSIP project, the Applicant is required to seek a Development Consent Order (DCO) to construct and operate the Proposed Development, under the 2008 Act. Section 37 of the 2008 Act governs the form, content and accompanying documents that are required as part of a DCO application ('the Application'). The requirements are implemented through the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations⁵ ('APFP Regulations') which state that an application must be accompanied by an Environmental Statement (ES), where a development is an 'EIA development' under the EIA Regulations¹.
- 1.3.4 Regulation 3(1) of the EIA Regulations defines the meaning of EIA development (with reference to Schedules 1 and 2 to the EIA Regulations). Schedule 1 of the EIA Regulations describes developments for which an EIA is necessary in all cases. The Proposed Development as a whole does not meet any of the definitions of Schedule 1. However, certain parts of the Proposed Development meet the definition of Schedule 1, Section 23, *"Installations for the capture of carbon dioxide streams for the purposes of geological storage pursuant to Chapter 3 of Part 1 of the Energy Act 2008 and any law that implemented Directive 2009/31/EC from installations referred to in this Schedule, or where the total yearly capture of carbon dioxide is 1.5 megatonnes or more."*
- 1.3.5 Schedule 2 of the EIA Regulations describes developments which may require an EIA to be undertaken depending on the scale of the development, its characteristics and the sensitivity of the environment in which the development would take place. Schedule 2 includes (under 3: Energy Industry), (a): *"industrial installations for the production of electricity, steam and hot water (projects not included in Schedule 1 to these Regulations)"*; and at (b) *"industrial installations for carrying gas, steam and hot water; transmission of electrical energy by overhead cables (projects not included in Schedule 1 to these Regulations)"*; and (under 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)."*
- 1.3.6 As such, the Proposed Development is of a description outlined in both Schedule 1 and Schedule 2. The Proposed Development, once fully developed, would result in the capture of approximately two million tonnes

⁵ UK Government (2009) The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

of CO₂ per annum. Therefore, the Proposed Development is considered to be a Schedule 1 EIA Development. EIA is compulsory for Schedule 1 developments, given that the type and/ or the scale of the development is likely to have the potential for significant effects on the environment. As such, an EIA is required for the Proposed Development and an ES must be prepared in accordance with the EIA Regulations to accompany the Application. A formal EIA Screening Opinion is therefore not being sought from the SoS.

- 1.3.7 As the Applicant proposes to provide an ES with the Application, this EIA Scoping Report constitutes the Applicant's notification under Regulation 8 (1b) of the EIA Regulations.
- 1.3.8 Having determined that an ES will accompany the Application, pursuant to Regulation 10(1) of the EIA Regulations, the Applicant is applying to the SoS for their opinion as to the scope and level of detail of the information to be provided in the ES i.e. an Application for EIA Scoping Opinion.
- 1.3.9 Figure 1.1 (Appendix A – Volume II) illustrates the indicative land currently under consideration for the Proposed Development, which comprises the proposed HPF, generating station and associated infrastructure including Hydrogen Pipeline(s), utility connections, including a spur to the proposed NEP CO₂ pipeline and existing pipeline corridors containing industrial gases, as well as indicative laydown areas and a haul road for use during construction. As explained in Section 1.2, the Proposed Development Site does not include the proposed CO₂ T&S pipeline route as this is already consented by third-parties (NZT) although the cumulative effects of this development will be considered in the EIA.
- 1.3.10 A description of the existing land use within, and in proximity to, the Proposed Development Site and an overview of the Proposed Development is presented in Sections 2 and Section 3 of this report.

1.4 EIA Scoping Context

- 1.4.1 The scoping phase of the EIA process provides a framework for identifying potential environmental impacts arising from the Proposed Development, establishing the likely significant environmental effects and distinguishing the priority issues to be addressed within the ES. Scoping also allows stakeholders an early opportunity to comment on the proposed structure, methodology and content of the ES.
- 1.4.2 This EIA Scoping Report has been prepared in accordance with the relevant legislative provisions and associated Advice Notes (published by Planning Inspectorate; in particular Advice Note 7 'Environmental Impact Assessment: Preliminary Environmental Information and Environmental

Statements⁶ (Planning Inspectorate, 2020) (herein referred to as ‘Advice Note 7’).

- 1.4.3 Table 1.1 presents a list of information that should be included in a request for an EIA Scoping Opinion, as prescribed by Regulation 10(3) of the EIA Regulations. Table 1.2 presents the information highlighted in paragraph 4.2 (and associated Insert 2) of Advice Note 7 regarding the content of an EIA scoping report, including signposting to the location in this EIA Scoping Report where the relevant information is presented.

Table 1.1: Information required for a request for an EIA Scoping Opinion

Description of Information Required (Regulation 10(3))	Section in the EIA Scoping Report where presented
A plan to sufficiently identify the land.	Figure 1.1: Proposed Development Site Boundary (Appendix A - Volume II)
A description of the proposed development, including its location and technical capacity.	Section 2: The Site and Surrounding Area and Section 3: The Proposed Development
An explanation of the likely significant effects (LSE) of the development on the environment.	Section 5.2: Cumulative and Combined Effects Section 6: Potentially Significant Environmental Aspects

Table 1.2: Information provided in the EIA Scoping Report (Based on Advice Note 7)

Description of Information Required (Advice Note 7)	Section in the EIA Scoping Report where information is presented
The Proposed Development: - an explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development e.g. design parameters - referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development	Section 2 - 3.6 (The Proposed Development) Figure 1.1, Figure 1.2, Figure 3.1, Figure 3.2 (Appendix A - Volume II)

⁶ Planning Inspectorate (2020) Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements. 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 24/01/2025].

Description of Information Required (Advice Note 7)	Section in the EIA Scoping Report where information is presented
EIA Approach and Topic Areas • an outline of the reasonable alternatives considered and the reasons for selecting the preferred option • a summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues • a detailed description of the aspects and matters proposed to be scoped out of further assessment with justification provided • results of desk-top and baseline studies where available and where relevant to the decision to scope in or out aspects or matters • aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect e.g. criteria for determining sensitivity and magnitude • any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects	Section 3.9 (Consideration of Alternatives) Section 6: Potentially Significant Environmental Aspects – tables <i>'elements scoped in or out of future Environmental Impact Assessment'</i> and Section 8: Summary Section 6: Potentially Significant Environmental Aspects – <i>'potential impacts'</i> Section 7: Matters to be Scoped Out and Section 8: Summary Section 6: Potentially Significant Environmental Aspects – <i>'baseline conditions and receptors'</i> and relevant Appendices (Volume II) where referenced. Section 5: Environmental Impact Assessment Process Section 6: Potentially Significant Environmental Aspects <i>'Proposed Assessment Methodology'</i> sections Section 6: Potentially Significant Environmental Aspects <i>'Embedded Mitigation'</i> sections and Appendix B: Commitments Register
Information sources • references to any guidance and best practice to be relied upon • evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities) • an outline of the structure of the proposed ES	Section 6: Potentially Significant Environmental Aspects <i>'Legislation, Policy and Guidance'</i> context Section 6: Potentially Significant Environmental Aspects <i>'Consultation'</i> section Section 8: Summary

Source: Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information and Environmental Statements, Republished June 2020 (version 7)

1.5 EIA Scoping Report Structure

1.5.1 This EIA Scoping Report is structured in two volumes:

- Volume I - Main Report; and
- Volume II – Figures and Appendices.

1.5.2 The remainder of Volume I of this EIA Scoping Report is structured as follows:

- Section 2 - describes the Proposed Development Site and surrounding area together including any environmentally sensitive areas/ receptors within the vicinity of the Proposed Development Site.
- Section 3 - describes the key aspects of the Proposed Development including the infrastructure to be developed, its construction, the function of the operational plant, its decommissioning, and alternatives considered during development of the Proposed Development design.
- Section 4 - identifies the key documents relating to national and local planning policy in the area, as relevant to the Proposed Development.
- Section 5 - provides an overview of the approach to be taken in the EIA and the approach proposed in relation to assessing cumulative and combined effects of the Proposed Development with other developments.
- Section 6 - provides a discussion of how the Proposed Development may interact with the different aspects of the receiving environment, together with a description of the proposed assessment methodologies, guidance and best practice to be adopted for the EIA of the Proposed Development (or, as appropriate, its design).
- Section 7 - provides a summary of the matters proposed to be scoped out of the EIA and reasoning why.
- Section 8 - provides a summary of the matters and aspects proposed to be scoped in and out, justification for this decision and structure of the ES.

1.5.3 Within Volume II of this EIA Scoping Report, the following figures are provided within Appendix A:

- Figure 1.1: Proposed Development Site Boundary
- Figure 1.2: Proposed Development Site Boundary (aerial)
- Figure 3.1: Indicative Site Layout
- Figure 3.2: Key Construction Components
- Figure 5.1: Cumulative Assessment Long List
- Figure 6.2.1: Statutory Designated Sites within 15 km of Proposed Development
- Figure 6.2.2: Non-Statutory Designated Sites within 2 km of Proposed Development

- Figure 6.2.3: Protected and Notable Habitats Within 2km of Proposed Development
- Figure 6.4.1: Cultural Heritage Assets
- Figure 6.6.1: Superficial Geology and Permitted Waste Sites
- Figure 6.6.2: Solid Geology at Rockhead
- Figure 6.6.3: Provisional Agricultural Land Classification
- Figure 6.7.1: Zone of Theoretical Visibility – Digital Terrain Model
- Figure 6.7.2: Zone of Theoretical Visibility – Digital Surface Model (DSM) and Representative Viewpoint Locations
- Figure 6.7.3: Landscape Character
- Figure 6.7.4: Photos from Representative Viewpoints
- Figure 6.8.1: Marine Biodiversity
- Figure 6.11.1: Construction and Operational Noise and Vibration study area
- Figure 6.12.1: Socio-economics baseline
- Figure 6.13.1: Traffic Survey Site Locations (June 2024)
- Figure 6.13.2: Public Rights of Way
- Figure 6.14.1: Hydrological Constraints (WFD Water Bodies)
- Figure 6.14.2: Hydrological Constraints (Flood Risk)

1.5.4 The following technical appendices are included in Volume II:

- Appendix B: Commitments Register
- Appendix C: Initial Long List for Cumulative Effects Assessment
- Appendix D: Construction Dust Assessment Methodology
- Appendix E: Biodiversity Desk Study Results
- Appendix F: Gazetteer of Cultural Heritage Assets
- Appendix G: Landscape and Visual Impact Assessment Methodology
- Appendix H: Marine Biodiversity - Underwater Noise and Vibration Technical Appendix
- Appendix I: Environmental Sound Survey June 2024
- Appendix J: Major Accidents and Disasters Long List

2 The Site and Surrounding Area

2.1 Proposed Development Site

- 2.1.1 The HPF component of the Proposed Development will be located adjacent to the existing operational CATS Terminal - a natural gas reception and processing terminal located on Seal Sands, Teesside, which is owned (and operated) by the Kellas group through a joint venture known as CATS North Sea Limited, within the administrative boundary of SBC (approximate National Grid Reference (NGR) NZ 519245). The existing CATS Terminal receives natural gas from North Sea gas fields via an approximately 400 km gas pipeline which it processes to produce sale quality gas for distribution via the National Transmission System (NTS). The Proposed Development will be developed adjacent to the existing CATS Terminal on land that is both within the existing CATS Terminal fence line and land to the north of the existing CATS Terminal (i.e. beyond the fence line). This area was previously used as a laydown area during construction of the existing CATS Terminal and some hard standing, utilities and informal road networks remain, surrounded by vegetation, with occasional shrubs and small trees.

2.2 Definitions

- 2.2.1 For the purposes of this report, the main uses of each part of the Proposed Development Site have been summarised and simplified and are illustrated on Figure 3.1 (Appendix A – Volume II) (reproduced as Picture 3.1). Some parts of the Proposed Development Site may have more than one use (e.g. construction laydown, followed by development of permanent operational facilities) and in these cases, the permanent, long-term anticipated use of the area is reflected in the simplified layout shown on Figure 3.1. Indicative areas to be used for construction are shown on Figure 3.2. The layout of the Proposed Development will be progressed further during the preparation of the Application and presented in the ES. The parts of the Proposed Development Site are summarised below.
- 2.2.2 **The HPF Area:** Land required for the construction and operation of the HPF adjacent to the existing CATS Terminal. This approximately L-shaped area would encompass the land required for up to 3 hydrogen production trains, a proposed >50MW generating station and ancillary plant as well as carbon capture, compression and cooling infrastructure, and the ancillary equipment needed for the Proposed Development.
- 2.2.3 **Hydrogen Pipeline (west):** new hydrogen transmission/ distribution pipeline and associated above ground installations (AGI) from the HPF Area through predominantly agricultural and industrial land towards Cowpen

Bewley (western limit). Further details are provided in paragraph 3.2.18.

- 2.2.4 **Hydrogen Pipeline (east):** new hydrogen transmission/ distribution pipeline and associated AGI from the HPF Area under the River Tees, towards Wilton and into the administrative boundary of RCBC (eastern limit). The Applicant's preferred crossing is utilising an existing tunnel although other options are also subject to ongoing technical evaluation. Further details are provided in paragraph 3.2.18 - 3.2.23 and this is referred to herein as the 'River Tees crossing'.
- 2.2.5 **Proposed CO₂ piping connection:** A CO₂ piping connection from the HPF Area to a proposed AGI (being built by third parties) within the existing CATS Terminal is included (shown in Figure 3.1). From this AGI, the third-party CO₂ pipeline operator would be responsible for the onward transportation of CO₂ and its storage.
- 2.2.6 **Proposed CO₂ Export Connection Corridor:** Alternatively, in the event that the Applicant needs to connect directly to the NEP CO₂ Pipeline (i.e. the third party AGI is not developed on-Site), a CO₂ pipeline spur from the HPF Area is included in the Proposed Development Site (shown in Figure 3.1). The third-party CO₂ pipeline operator will then be responsible for the onward T&S of CO₂.
- 2.2.7 **Existing Natural Gas Connection Corridor:** A proposed tie-in connection for the HPF from either the existing gas pipeline within the adjacent existing CATS Terminal or a tie-in to the NTS AGI located within the existing CATS Terminal.
- 2.2.8 **Raw Water Connection Corridor:** A proposed tie-in for the HPF to the existing raw water main operated by Northumbrian Water Limited (NWL) located adjacent to (but outside of) the existing CATS Terminal.
- 2.2.9 **Effluent Water Connection Corridor:** a new dedicated effluent pipeline from the HPF Area to the NWL Bran Sands Water Treatment Facility located on the eastern bank of the River Tees, near Redcar.
- 2.2.10 **Wastewater Connection Corridor:** Proposed replacement infrastructure to allow uncontaminated surface runoff and treated wastewater produced at the HPF to discharge from site. The preferred option is for this treated wastewater to discharge to Greatham Creek, subject to regulatory approval, replacing an existing reedbed drainage system serving the existing CATS Terminal, which would be removed during construction of the Proposed Development and replaced. A number of treatment solutions remain under consideration and the preferred option will be confirmed in the ES following ongoing design.
- 2.2.11 **Shared Pipeline/ Utilities Corridor:** an area in which a number of utility connections for the Proposed Development may be routed, as described in

this report and shown on Figure 3.1.

- 2.2.12 **Electrical Connection Corridor:** a new up to 132kv electrical connection to the HPF from the existing Northern Powergrid (NPG) Saltholme substation.
- 2.2.13 **Construction Haul Route:** following use of existing marine offloading facilities at Port Clarence, use of an existing heavy haul road, including minor upgrades, where required.
- 2.2.14 **Indicative Construction Laydown Areas:** areas currently under consideration for temporary laydown and/ or contractor facilities during construction of the Proposed Development.
- 2.2.15 The Proposed Development Site encompasses an area of approximately 574 hectares (ha) and is indicative at this stage. The HPF Area comprises approximately 22ha of land, adjacent and to the north of the existing CATS Terminal (13ha); the remainder of the Proposed Development Site (approximately 539ha) is land under consideration and evaluation for the routing options for the Hydrogen Pipeline and related connections (e.g. CO₂ Export Corridor). A wider corridor is currently under consideration for the Hydrogen Pipeline to allow for flexibility in routeing and for construction laydown and access routes. It is envisaged that this corridor will be refined following ongoing studies prior to submission of the Application.
- 2.2.16 The extent of the Proposed Development Site shown on Figure 3.1 (reproduced in Picture 3.1) is therefore anticipated to be the maximum area required for the Proposed Development. The final layout that will be incorporated within the proposed DCO Order Limits will be determined through ongoing studies of potential constraints and discussions with relevant stakeholders. The Applicant is also identifying areas for biodiversity mitigation and enhancement, although these are not currently shown in the Proposed Development Site.

2.3 Local Topography and Surrounding Land Use

- 2.3.1 The topography of the HPF Area is relatively flat, with typical ground levels of between 4 – 8 m above ordnance datum (AOD)⁷.
- 2.3.2 The Seal Sands industrial area which surrounds the Proposed Development Site is characterised by existing commercial and industrial land uses primarily associated with the oil, gas and chemical industries. Most of the land immediately adjoining the HPF Area is currently unoccupied, with the exception of an existing gas processing plant to the south-west.

⁷ England Topographic Map. Available at: <https://en-gb.topographic-map.com/map-kb57/England/?center=54.61065%2C-1.13503&zoom=13&zoom=12&base=4> [Accessed 24/01/2025].

2.4 Environmental Receptors

- 2.4.1 Several environmental receptors have been identified within and in the vicinity of the Proposed Development Site. These are described below in relation to their proximity to the HPF Area (paragraph 2.4.2 - 2.4.21) and to the Hydrogen Pipeline (paragraph 2.4.23 - 2.4.47). All distances are approximate and given as the shortest distance between the receptor and the closest point of the HPF Area or Hydrogen Pipeline(s) within the Proposed Development Site.

Hydrogen Production Facility

- 2.4.2 The following environmental receptors have been identified in the vicinity of the HPF Area and existing CATS Terminal. An initial study area of 2 km for human beings and other environmental receptors was chosen to identify key receptors in the surrounding area for the purposes of defining the Proposed Development Site and surround area context in this section. For many topics, this is generally the distance beyond which significant environmental effects are unlikely to occur; however, each individual topic sets out their own study area in Section 6 and Section 7 of this EIA Scoping Report.

Human Beings

- 2.4.3 There are no residential receptors within the Proposed Development Site. The closest residential property to the HPF Area is located approximately 2.1 km north-west at Marsh House Farm. Recreational receptors also use the study area including users of the King Charles III England Coast Path located 1.0 km west and other visitor facilities including the Saltholme Nature Reserve operated by the Royal Society for the Protection of Birds (RSPB) located 920 m to the south-west of the HPF Area. Refer to Figure 6.12.1: Socio-economic baseline (Appendix A) for the location of recreational receptor locations.
- 2.4.4 At greater distances, residential areas are present at Greatham (3 km north-west), Cowpen Bewley (3.5 km west) and beyond this Billingham (4.5 km west) of the HPF Area; at Port Clarence (3.3 km south-west); and south of the River Tees, Middlesbrough, located around 4.5 km south of the HPF Area. To the east, residential areas of Dormanstown are located approximately 5.7 km from the HPF Area and Warrenby, Greatham, Redcar and Kirkleatham are located beyond this. Further to the south are the residential areas of Grangetown, South Bank and Brambles Farm.

Ecology

- 2.4.5 According to desk-top study and field surveys undertaken to date, the HPF

Area is characterised by a combination of lowland calcareous grassland and open mosaic habitat (OMH), with areas of neutral grassland, unvegetated developed land and smaller areas of scrub and reedbed. The HPF Area includes several minor waterbodies.

- 2.4.6 Greatham Creek Nature Reserve, owned by Natural England and Teesmouth and Cleveland Coast Special Protection Area (SPA), Ramsar and Site of Special Scientific Interest (SSSI) and Teesmouth National Nature Reserve (NNR) are located to the north of the HPF Area and existing CATS Terminal. These statutory and other non-statutory designated ecological sites in proximity to the HPF Area are illustrated on Figure 6.2.1 and Figure 6.2.2 (Appendix A) and described in Table 2.1.

Table 2.1: Key ecological receptors within 2 km of the hydrogen production facility Area

Receptor	Distance from HPF Area/ existing CATS Terminal (m or km)	Direction from HPF Area/ existing CATS Terminal
Statutory Designated Sites		
Teesmouth and Cleveland Coast SSSI	0 m	West
Teesmouth NNR	5 m	West
Teesmouth and Cleveland Coast SPA/ Ramsar	5 m	West
Non-Statutory Designated Sites		
Greatham Creek Local Wildlife Site (LWS)	460 m	North
Greatham Creek LWS/ Greatham Creek North Bank Saltmarsh LWS	675 m	North
Greenabella Marsh LWS	675 m	North
RSPB Saltholme	920 m	South-west
Greatham Northwest LWS	1.0 km	North-west
Phillips Tank Farm Grassland LWS	1.3 km	North-west
Zinc Works Bird Field LWS	1.9 km	North-east

Air Quality

- 2.4.7 There are no Air Quality Management Areas (AQMA) in the RCBC or SBC administrative areas.

Hydrology and Flood Risk

- 2.4.8 The River Tees (a Main River⁸) discharges to the North Sea and is located 2.1 km south-east of the HPF Area. The Proposed Development Site (Hydrogen Pipeline (east)) crosses below the River Tees as described in paragraphs 3.2.21 - 3.2.23. The River Tees is tidal with the normal tidal limit approximately 14 km upstream at the Tees Barrage. The location of watercourses is shown on Figure 6.14.1 (Appendix A).
- 2.4.9 Within a 1 km study area from the HPF Area, Holme Fleet, (a Main River) flows in a southerly direction before discharging to the River Tees and several other unnamed drains are present, including tributaries of Holme Fleet.
- 2.4.10 The HPF Area lies 700 m to the south-east of Greatham Creek, part of the Tees Estuary system. Tributaries of Greatham Creek are located within 460 m of the HPF Area. Several other small ditches and ponds are located on and within proximity to the HPF Area.
- 2.4.11 The Environment Agency 'Flood map for planning'⁹ indicates that the whole of the HPF Area is located within Flood Zone 1 (defined as land that has a less than 0.1% annual exceedance probability (AEP) of flooding from rivers or the sea) as illustrated on Figure 6.14.2 (Appendix A). The HPF Area is located within an area benefiting from flood defences maintained by the Environment Agency. Adjacent land to the north and west is located within Flood Zones 2 (between 0.1% and 1% AEP river flooding and between 0.1% and 0.5% AEP sea flooding) and Flood Zone 3 (1% or greater AEP river flooding and 0.5% or greater AEP sea flooding, i.e. a high probability of flooding without flood defences).

Geology and Hydrogeology

- 2.4.12 A review of the publicly available British Geological Survey (BGS) geological maps¹⁰ indicate that the HPF Area is underlain by a sequence of Made Ground, Tidal Flat Deposits and Glacial Till (Boulder Clay)/ Glacio-lacustrine deposits, underlain by Triassic Mercia Mudstone bedrock in the north-west, Triassic Penarth Formation in the centre and Jurassic Redcar Mudstone Formation in the south-east. Superficial and solid geology underlying the study area is shown on Figure 6.6.1 and Figure 6.6.2 (Appendix A).
- 2.4.13 The HPF Area is located over 6 km south-west of the nearest aquifer source

⁸ A river maintained directly by the Environment Agency. They are generally larger watercourses than Ordinary rivers.

⁹ UK Government (2024) Flood Risk Information for Planning. Available at: <https://flood-map-for-planning.service.gov.uk/> [Accessed 24/01/2025].

¹⁰ British Geological Society Geology Viewer (n.d) Available at: https://geologyviewer.bgs.ac.uk/?_ga=2.79785751.122330470.1698395382-1106009955.1698395382 [Accessed 24/01/2025].

protection zone (SPZ). There are no nitrate vulnerable zones (NVZ), drinking water protected areas (DWPA), drinking water safeguard zones (DWSZ) (Surface Water and Groundwater)¹¹ located within 1 km of the HPF Area.

Cultural Heritage

- 2.4.14 There are no statutory designated or non-designated heritage assets within the HPF Area. There are approximately 90 listed buildings within a 5 km study area of the HPF Area. The closest listed buildings to the HPF Area are:
- Grade II Hall's Farmhouse (National Heritage List for England (NHLE): 1329833), located approximately 3.5 km west.
 - Grade II* Ivy House (NHLE: 1139244) and Grade II* Barn to West of Ivy House (NHLE: 1139245) both located approximately 3.5 km west.
 - Grade II* Nightingale's Farmhouse and Barn (NHLE 1139243) located approximately 3.5 km west.
 - Grade II Haverton Hill and Port Clarence War Memorial (NHLE: 1439661) located approximately 3.4 km south-west.
 - Grade II* Transporter Bridge (NHLE: 1139267) located approximately 3.4 km south-west.
 - Grade II Hospital Chapel (NHLE: 1249890) and Grade II* Church of St John the Baptist (NHLE: 1263522) located approximately 3.5 km north-west of the HPF Area.
- 2.4.15 Four conservation areas are located within 5 km of the HPF Area:
- Cowpen Bewley, located approximately 3.4 km west.
 - Greatham, located approximately 3.2 km north-west.
 - Middlesbrough Historic Quarter located approximately 4.1 km south-west.
 - Seaton located approximately 4.2 km north of the HPF Area.
- 2.4.16 There is one scheduled monument within a 5 km study area of the HPF Area. This is Claxton medieval moated site scheduled monument, located 4.8 km north-west of the HPF Area. Grade II Albert Park (NHLE: 100646) registered park and garden is located just beyond (i.e. >5 km) the HPF Area.
- 2.4.17 There are no world heritage sites, registered battlefields, or heritage coasts within 5 km of the HPF Area.

¹¹ Environment Agency (n.d) Check for Drinking Water Safeguard Zones and NVZs. Available at: <https://environment.data.gov.uk/farmers/> [Accessed 24/01/2024].

- 2.4.18 The location of cultural heritage assets is shown on Figure 6.4.1 (Appendix A).

Landscape

- 2.4.19 The location of Landscape Character Areas (LCA) is shown on Figure 6.7.3 (Appendix A – Volume II). The HPF Area is located within the Tees Lowlands National Character Area (NCA).¹² The NCA comprises a broad, open plain dominated by the meandering lower reaches of the River Tees and its tributaries, with wide views to distant hills in addition to high quality agricultural land. The HPF Area is also located within the North Yorkshire, York and Lower Tees Valley Historic Landscape Character identified as 'Industrial' (historic environment record (HER): HNY6156). The North York Moors National Park is located 11 km south-east of the HPF Area.

Noise and Vibration

- 2.4.20 The location of Noise Important Area(s) (NIA) are shown on Figure 6.11.1 (Appendix A). There are no NIA located within 1 km of the HPF Area for road traffic or railway noise.

Traffic and Transport

- 2.4.21 The location Public Rights of Way (PRoW) is shown on Figure 6.13.2 (Appendix A). No PRoW cross through the HPF Area.
- 2.4.22 The A178 runs approximately 990 m west of the HPF Area. Access into the HPF Area via the existing CATS Terminal is described in section 3.2.36.

Hydrogen Pipeline(s)

- 2.4.23 The following environmental receptors have been identified within a 2 km study area of the Hydrogen Pipeline(s).

Human Beings

- 2.4.24 The area of land under consideration for the Hydrogen Pipeline(s) is predominantly located within industrial land and farmland, and as such, does not include any residential receptors.
- 2.4.25 The Hydrogen Pipeline (west) is in closest proximity to residential receptors at Cowpen Lane, whilst the closest residential properties in the vicinity of the Hydrogen Pipeline (east) are located at Wilton Avenue and Broadway West, near Dormanstown. Human receptors located within 2 km of the

¹² Natural England (2013) NCA Profile: 23 Tees Lowland (NE439). Available at: <https://publications.naturalengland.org.uk/publication/9860030?category=587130> [Accessed 24/01/2025].

Hydrogen Pipeline are presented in Table 2.2.

Table 2.2: Key human receptors within 2 km of the Hydrogen Pipeline

Receptor	Distance from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west) (m/ km)	Direction from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west)
Hydrogen Pipeline (east)		
Residential Areas		
Dormanstown	75 m	North-east
Lazenby	775 m	South
Kirkleatham village	980 m	North-east
Wilton	1.3 km	South
Warrenby	1.5 km	North-east
Redcar	1.6 km	North-east
Castle Dene Retirement Home	1.6 km	South
Health Care Facilities		
Brookfield Care Home	1.2 km	South
Redcar Primary Care Hospital	2 km	East
Education Facilities		
Dormanstown Primary School	460 m	North-east
Kirkleatham Hall School	895 m	East
Wilton Primary School	965 m	South
Riverdale Primary School	1.4 km	North-east
Outwood Academy Redcar	1.5 km	North-east
Newcomen Primary School	1.7 km	North-east
Green Gates Primary School	1.7 km	North-east
Recreation Facilities		
King Charles III England Coast Path	0 m	West
Corus Sports and Social Centre	685 m	East
The New Coatham Caravan Park	1.8 km	North-east
Hydrogen Pipeline (west)		
Residential Areas		
Cowpen Bewley	70 m	South-east
Haverton Hill	725 m	South
Marsh House Farm	1.3 km	North

Receptor	Distance from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west) (m/ km)	Direction from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west)
Education Facilities		
St Michael's Catholic Academy	580 m	West
Bewley Primary School	600 m	North-west
St Joseph's Roman Catholic Primary School	650 m	West
Oakdene Primary School	975 m	West
Bede Sixth Form College	1.2 km	West
Recreation Facilities		
Cowpen Bewley Woodland Park and designated open space	0 m	West
Billingham Rugby Club	1.2 km	West

2.4.26 Other non-residential receptors are also located in close proximity to the Hydrogen Pipeline(s), including offices of the existing industrial developments and community facilities including Billingham Community Fire Station (immediately west of the Hydrogen Pipeline (west) and 1.5 km south-west of the HPF Area).

Ecology

2.4.27 The Hydrogen Pipeline (east) crosses previously developed land which includes land undergoing site clearance. It is therefore characterised by urban habitats and substantial areas of OMH and neutral grassland.

2.4.28 The Hydrogen Pipeline (west) is in the vicinity of Cowpen Bewley. The route and adjacent land includes parts of Cowpen Bewley Woodland Park, non-operational land at Saltholme Power Station, areas of modified and neutral grassland, scrub, hedgerow and watercourses as well as areas of OMH and reedbeds.

2.4.29 The Hydrogen Pipeline (east) crosses the Teesmouth and Cleveland Coast SPA and SSSI within the River Tees and the spur immediately east of the HPF Area coincides with this SPA and SSSI. The Teesmouth NNR lies 660 m north of this spur. The route of the Hydrogen Pipeline (west) crosses or is in close proximity to several intertidal/ terrestrial areas of the Teesmouth and Cleveland Coast proposed Ramsar, SPA and SSSI. There are no Special Areas of Conservation (SAC) within 5 km of the Hydrogen Pipeline(s).

2.4.30 Lovell Hill Pools SSSI is located approximately 2.6 km south-east of the

Hydrogen Pipeline (east).

- 2.4.31 No areas of designated ancient woodland intersect the Hydrogen Pipeline. The closest area of ancient and semi-natural woodland (ASNW) known as Wilton Wood, (part of the Wilton Wood Complex LWS) is located 1.6 km south-east of the Hydrogen Pipeline (east).
- 2.4.32 Several Local Nature Reserves (LNR) and LWS intersect the route of the Hydrogen Pipeline(s) including Cowpen Bewley Woodland Country Park (Hydrogen Pipeline (west)) and Eston Pumping Station (Hydrogen Pipeline (east)).
- 2.4.33 Table 2.3 provides an overview of statutory and non-statutory designated sites located in proximity to the Hydrogen Pipeline(s).

Table 2.3: Key ecological receptors within 2 km of the Hydrogen Pipeline

Receptor	Distance from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west) (m/ km)	Direction from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west)
Hydrogen Pipeline (east)		
Statutory Designated Sites		
Teesmouth and Cleveland Coast SSSI/SPA	0 m	West
Teesmouth NNR	660 m	North
Non-Statutory Designated Sites		
Eston Pumping Station LWS	0 m	West
Coatham Marsh LWS	790 m	North-east
Wilton Wood LWS	1.2 km	South-east
Greatham Creek LWS/Greatham Creek North Bank Saltmarsh LWS	1.3 km	North
Greenabella Marsh LWS	1.5 km	North-west
Wilton Wood Ancient Woodland LWS	1.6 km	South-east
Greatham North West LWS	1.7 km	North-west
Saltern Marsh LWS	1.7 km	North-west
Phillips Tank Farm Grassland LWS	2 km	North-west
Hydrogen Pipeline (west)		
Statutory Designated Sites		
Teesmouth and Cleveland Coast SSSI/SPA	0 m	West

Receptor	Distance from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west) (m/ km)	Direction from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west)
Teesmouth and Cleveland Coast Ramsar	25 m	East
Cowpen Bewley Woodland Country Park LNR	0 m	West
Non-Statutory Designated Sites		
RSPB Saltholme	0 m	West
Cowpen Bewley Woodland Country Park LWS	0 m	West
Tot Fenny's Meadow	925 m	North
Greatham Creek LWS/Greatham Creek North Bank Saltmarsh LWS	1.3 km	North
Charlton's Pond LNR	1.4 km	West
Greenabella Marsh LWS	1.5 km	North-west
Teessaurus Park LWS	1.5 km	South
Greatham North West LWS	1.7 km	North-west
Saltern Marsh LWS	1.7 km	North-west
Phillips Tank Farm Grassland LWS	2 km	North-west

Hydrology and Flood Risk

2.4.34 Named watercourses within 1 km of the Hydrogen Pipeline are presented in Table 2.4.

Table 2.4: Water features within 1 km of the Hydrogen Pipeline

Receptor	Distance from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west) (m/ km)	Direction from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west)
Hydrogen Pipeline (east)		
Mains Dike	0 m	West
Dabholm Gut	0 m	West
River Tees	0 m	West
The Mill Race	0 m	N/A
Dabholm Beck	10 m	North
The Fleet	15 m	North
Ash Gill	320 m	North-east
Castle Gill	490 m	South-west

Receptor	Distance from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west) (m/ km)	Direction from the Hydrogen Pipeline (east) or the Hydrogen Pipeline (west)
Knitting Wife Beck	880 m	South-east
Hydrogen Pipeline (west)		
Belasis Beck	55 m	South
Holme Fleet	70 m	North
Swallow Fleet	460 m	North-west
Cowbridge Beck	680 m	North-east
Holme Fleet Offtake	785 m	North
Claxton Beck	1 km	North-east

2.4.35 Unnamed watercourses/ tributaries and other minor named watercourses within 1 km of the Hydrogen Pipeline not shown on Figure 6.14.1 (Appendix A) will be outlined within the ES.

2.4.36 The Environment Agency 'Flood map for planning' indicates that approximately half of the Hydrogen Pipeline (west) is located within Flood Zone 2 or Flood Zone 3 (refer to Figure 6.14.2 in Appendix A). The areas within Flood Zones 2 and 3 are around the SABIC brinefields, Saltholme and Billingham. The River Tees crossing and Effluent Water Connection Corridor near to Bran Sands Water Treatment Facility along the route of the Hydrogen Pipeline (east) are also located in Flood Zones 2 and 3. Further details can be found in Section 6.14: Water Environment.

Geology and Hydrogeology

2.4.37 A review of the publicly available BGS geological maps indicate that the Hydrogen Pipeline is variably underlain by a sequence of Made Ground, Tidal Flat Deposits, Alluvium (Clay, Silt, Sand and Gravel), Mudstone, Devensian Glaciolacustrine Deposits (Clay and Silt) and Devensian Till (Diamicton). The superficial deposits are underlain by the Triassic Sherwood Sandstone Group beneath the Hydrogen Pipeline (west). The eastern area is underlain by mudstones from the Triassic Mercia Mudstone Group and the Jurassic Redcar Mudstone Formation.

2.4.38 There are no SPZ, DWPA or DWSZ (Surface Water and Groundwater) within 1 km of the Hydrogen Pipeline. A small part of the Hydrogen Pipeline, in Billingham, falls within a designated NVZ.

Cultural Heritage

2.4.39 There are six listed buildings, located within the Cowpen Bewley Conservation Area that are intersected by the Hydrogen Pipeline (west) and

around 300 listed buildings within a wider 5 km study area of the Hydrogen Pipeline.

- 2.4.40 In addition to the Cowpen Bewley Conservation Area which the Hydrogen Pipeline (west) intersects, there are an additional 10 conservation areas within 5 km of the Hydrogen Pipeline, including Kirkleatham Conservation Area approximately 355 m east; Wilton Conservation Area approximately 980 m south; and Coatham Conservation Area approximately 2 km north-east of the Hydrogen Pipeline (east).
- 2.4.41 There are 25 scheduled monuments within 5 km of the Hydrogen Pipeline, the closest of which are Claxton medieval moated site (2.6 km north of the Hydrogen Pipeline (west)), and Bowl barrow 1.1 km north-west of High Court Green and Eston Nab hill fort, palisaded settlement and beacon – both located 2.7 - 2.8 km south of the Hydrogen Pipeline (east). Claxton medieval moated site is located approximately 2.3 km north of the Hydrogen Pipeline (west).
- 2.4.42 There is one registered park and garden within 5 km of the Hydrogen Pipeline: Grade II Albert Park (100646), located approximately 3.9 km south of the Hydrogen Pipeline (west).
- 2.4.43 There are no world heritage sites, registered battlefields or heritage coasts within 5 km of the Hydrogen Pipeline(s).

Landscape

- 2.4.44 The Hydrogen Pipeline is located within the Tees Lowland NCA. There are no landscape character designations covering the industrial complexes along the banks of the River Tees, including the Hydrogen Pipeline and the surrounding area.

Noise and Vibration

- 2.4.45 There are two Noise Important Areas (NIA) located within 1 km of the Hydrogen Pipeline (east) and three NIA located within 1 km of the Hydrogen Pipeline (west) for road traffic. There are no railway NIA near the Hydrogen Pipeline.

Traffic and Transport

- 2.4.46 The route of the Hydrogen Pipeline crosses the Tees Valley Line Railway and several PRoW (refer to Figure 6.13.2 in Appendix A):
 - Billingham 30 (byway)
 - Billingham 31 (footpath)
 - Billingham 34 (footpath)

- Redcar and Cleveland 116 31/1 (footpath)
- Redcar and Cleveland 116 9/2 (bridleway)
- Redcar and Cleveland 116 10/2 (bridleway)

2.4.47 The route of the Hydrogen Pipeline crosses several public highways including:

- A1085 (Trunk Road)
- A179 (Seaton Carew Road)
- A1185
- Cowpen Bewley Road
- Cowpen Lane
- Wolviston Back Lane
- Marsh Lane
- Boundary Road North
- Boundary Road East
- Middle Way
- East Way
- Queensway East
- Second Avenue

2.5 Elements of the Proposed Development within the marine environment

2.5.1 The marine environment is defined as any area seaward of the mean high-water spring (MHWS) mark of any tidally influenced water body (i.e. any area below MHWS). This includes intertidal zones, which are periodically exposed by the tide and subtidal zones which are always submerged.

2.5.2 In England, the Marine and Coastal Access Act (2009) (MCAA)¹³ provides that a marine licence (ML) is required for certain ‘licensable activities’ within the UK Marine Area (Section 42, MCAA). These activities include deposits, removals and construction/‘alteration’ works (Section 66, MCAA) which are below MHWS.

2.5.3 As described in paragraphs 3.3.20 - 3.3.25, the Hydrogen Pipeline (east) River Tees crossing is proposed to be constructed either via the Applicant’s preferred option (an existing tunnel) or alternatively via a new crossing

¹³ UK Government (2009). Marine and Coastal Access Act 2009. Available at: <https://www.legislation.gov.uk/ukpga/2009/23/contents> [Accessed 24/01/2025].

below the bed of the River Tees; therefore, this activity is not considered to require a ML, although marine environment elements which have the potential to experience impacts during Hydrogen Pipeline installation have been considered within this EIA Scoping Report.

- 2.5.4 The Wastewater Connection Corridor is anticipated to involve the construction of a new outfall at Greatham Creek. This aspect may involve licensable (or exempt) activities, depending on its design. In accordance with PINS Advice¹⁴, the Applicant has begun to engage with the MMO, and further engagement is planned in relation to the scope, content and detail of any deemed marine licence (DML) if licensable activities are proposed that are to be secured via the DCO for the Proposed Development.
- 2.5.5 Initial engagement with the Marine Management Organisation (MMO) commenced in 2024 including a meeting in February 2024 to discuss licensing requirements and to request EIA screening in relation to the Marine Works (EIA) Regulations 2007 (as amended)¹⁵ on elements of the Proposed Development. Following this, the MMO issued a Screening by Agreement letter for the Proposed Development on 14 March 2024 (reissued 8 April 2024 with minor administrative updates). Consultation and additional technical engagement with the MMO will continue as required, as the design of the Proposed Development evolves.

¹⁴Planning Inspectorate (2024) Nationally Significant Infrastructure Projects: Advice on working with public bodies in the infrastructure planning process. Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-working-with-public-bodies-in-the-infrastructure-planning-process> [Accessed 24/01/2025].

¹⁵ UK Government (2007) The Marine Works (Environmental Impact Assessment) Regulations 2007. Available at: <https://www.legislation.gov.uk/uksi/2007/1518/contents/made> [Accessed 24/01/2025].

3 The Proposed Development

3.1 Overview

- 3.1.1 The Proposed Development comprises the construction, operation and maintenance and eventual decommissioning of a CCS enabled blue HPF of up to approximately 1GWth capacity, adjacent to the existing CATS Terminal at Seal Sands, Stockton-on-Tees, and associated Hydrogen Pipeline(s). Hydrogen produced by the Proposed Development will be transported via the Hydrogen Pipeline(s) to both existing and new industrial gas users to support decarbonisation via fuel switching within process heat, steam raising and power generation applications.
- 3.1.2 The Proposed Development is anticipated to be developed in two phases, comprising of up to three trains, each with a capacity ranging from approximately 355 megawatt thermal (MWth) up to 710MWth; Phase 1 will develop a single HPF train of up to 710MWth capacity. Phase 2 may add one or two further trains, each of up to 710MWth capacity, to develop out total plant capacity to approximately 1GWth.
- 3.1.3 The Proposed Development may comprise the following elements:
- HPF process infrastructure including gas purification, steam saturation, Gas Heated Reformer (GHR) and Auto-Thermal Reformer (ATR), cooling towers, flare stack, pressure swing adsorption (PSA) system, hydrogen compression and integration with the existing CATS Terminal;
 - Hydrogen Pipelines to distribute and supply H₂ to various off-takers within the surrounding area;
 - multiple AGI at both the HPF Area and along the Hydrogen Pipeline(s);
 - air separation unit(s) (ASU) to supply O₂ for the H₂ production process;
 - O₂ and N₂ supply pipelines (in-combination with, or as an alternative to the ASU) to supply O₂ and N₂ from third-party providers for the H₂ production process;
 - CO₂ capture and compression facilities and a connection to the NEP CO₂ pipeline which will transport the captured CO₂ to the offshore sequestration site;
 - a natural gas supply connection for the supply of gas to the H₂ production plant;
 - an electricity grid connection to provide power to the Proposed Development;
 - electricity generation infrastructure with a capacity in excess of 50MW, to be developed as part of and to supply electricity and potentially steam to the HPF;

- water supply and treatment infrastructure;
- wastewater storage and disposal infrastructure including a new effluent pipeline and wastewater pipeline with a new outfall at Greatham Creek;
- other utilities connections, telecommunications, and other associated and ancillary infrastructure;
- associated buildings (compressor/ substation/ administration/ warehouse/ store etc.);
- highways, streets and PRow diversions and modifications;
- temporary construction laydown areas and contractors' sites;
- use of an existing heavy haul road including upgrades where required; and
- environmental mitigation.

3.1.4 At this stage of the Proposed Development, there are still several options being considered for some elements of the design. The design of the Proposed Development incorporates a necessary degree of flexibility to allow for the future selection of the preferred layout of the HPF and components, as well as routing of the Hydrogen Pipeline(s) and other connections. This will evolve as the design definition continues to mature throughout the preparation of the Application.

3.1.5 The Rochdale Envelope approach will be adopted in the Application to provide design parameters, including maximum extents of physical infrastructure, to define an overall consenting envelope that encompasses worst-case impacts for the purposes of assessing likely significant effects (LSE) in the ES in accordance with PINS Advice Note 9¹⁶.

3.1.6 Potential areas that could be subject to change at this stage and where flexibility may be required include the location, dimensions, orientation, and design of the following:

- single or two-phase construction of Phase 2 of the Proposed Development (up to 2 trains), and capacity of those trains;
- spacing between components/ trains and area/ land requirements;
- final stack locations, heights and massing of structures and buildings to allow flexibility in selection of preferred technology configuration for the Phase 2 generating station within the HPF Area;
- inclusion/ exclusion of electricity generating station within the Proposed Development;

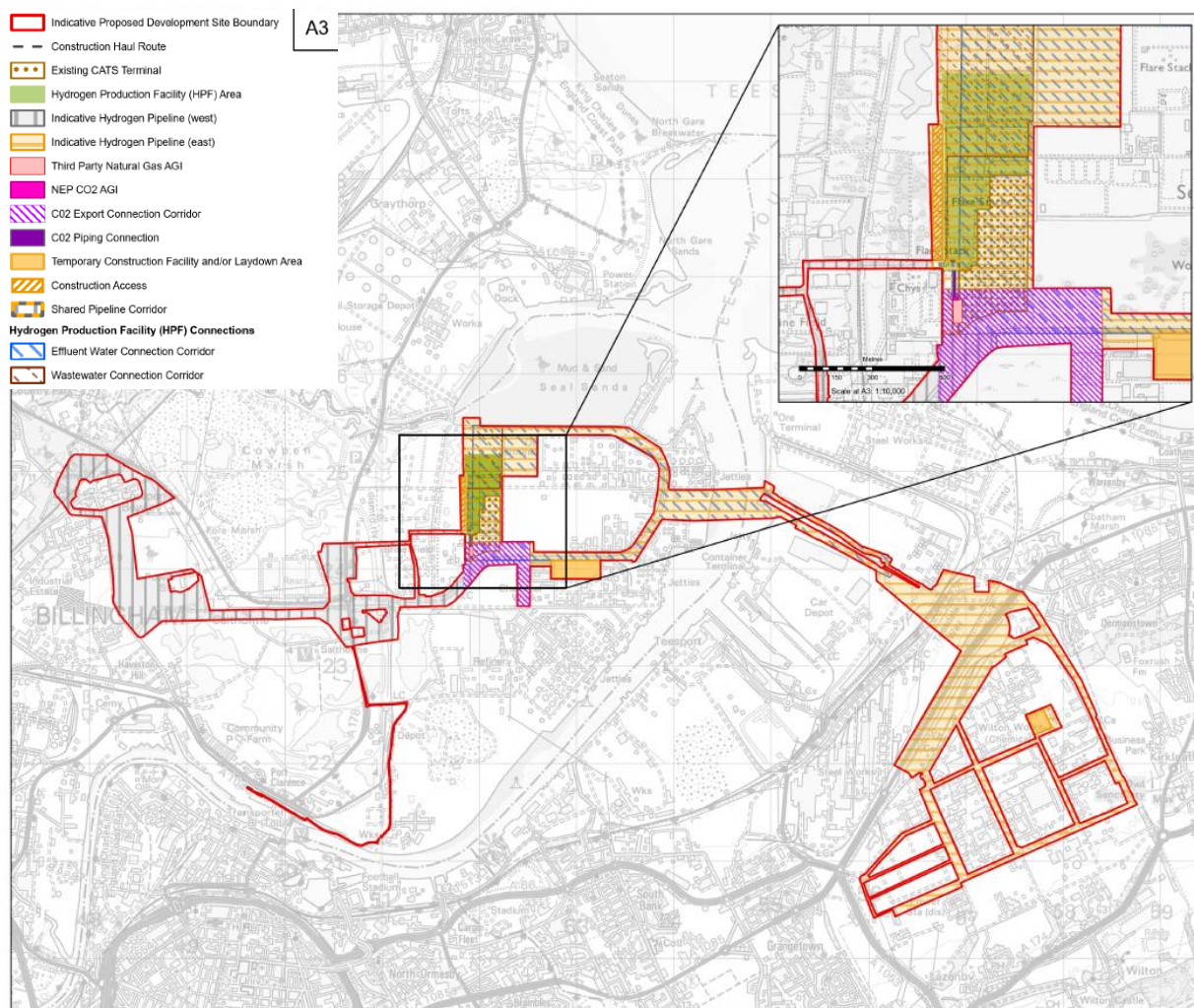
¹⁶ Planning Inspectorate (2018) Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope. Available at: <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope> [Accessed 24/01/2025].

- inclusion/ exclusion of one or more ASU within the Proposed Development;
- routing of the Hydrogen Pipelines and River Tees crossing design/ method;
- number and heights/ dimensions of flares;
- size of construction camp and laydown areas required;
- number and locations of H₂ AGI within the Hydrogen Pipeline(s); and
- areas required for mitigation and/ or BNG.

3.1.7 These parameters are likely to be refined as the design progresses, although it is anticipated that the Rochdale Envelope as applied will always need to retain some flexibility to allow different vendor equipment to be selected at a later date.

3.1.8 A conceptual layout for the Proposed Development Site is provided as Figure 3.1 (Appendix A – Volume II), reproduced in Picture 3.1. The layout will be developed following further engineering evaluation, consultation with stakeholders and on conclusion of further technical and environmental studies.

Picture 3.1: Proposed Development Overview



3.2 Description of the Proposed Development

3.2.1 The following sections describe the Proposed Development in more detail including optionality where this is being considered by the Applicant.

Hydrogen Production Facility

3.2.2 The HPF will be designed taking account of Best Available Techniques (BAT) as set out in both European and the UK Government's guidance on emerging techniques for hydrogen production with carbon capture¹⁷.

3.2.3 It is currently anticipated that Phase 1 of the HPF will utilise a low carbon hydrogen production technology to generate compressed H₂, with a purity exceeding 99.9% by volume using a feedstock of natural gas or alternative fuel gas, along with water and oxygen. The process can be summarised as

¹⁷ Environment Agency (2023) Hydrogen production with carbon capture: emerging techniques. Available at: <https://www.gov.uk/guidance/hydrogen-production-with-carbon-capture-emerging-techniques> [Accessed 24/01/2025].

follows:

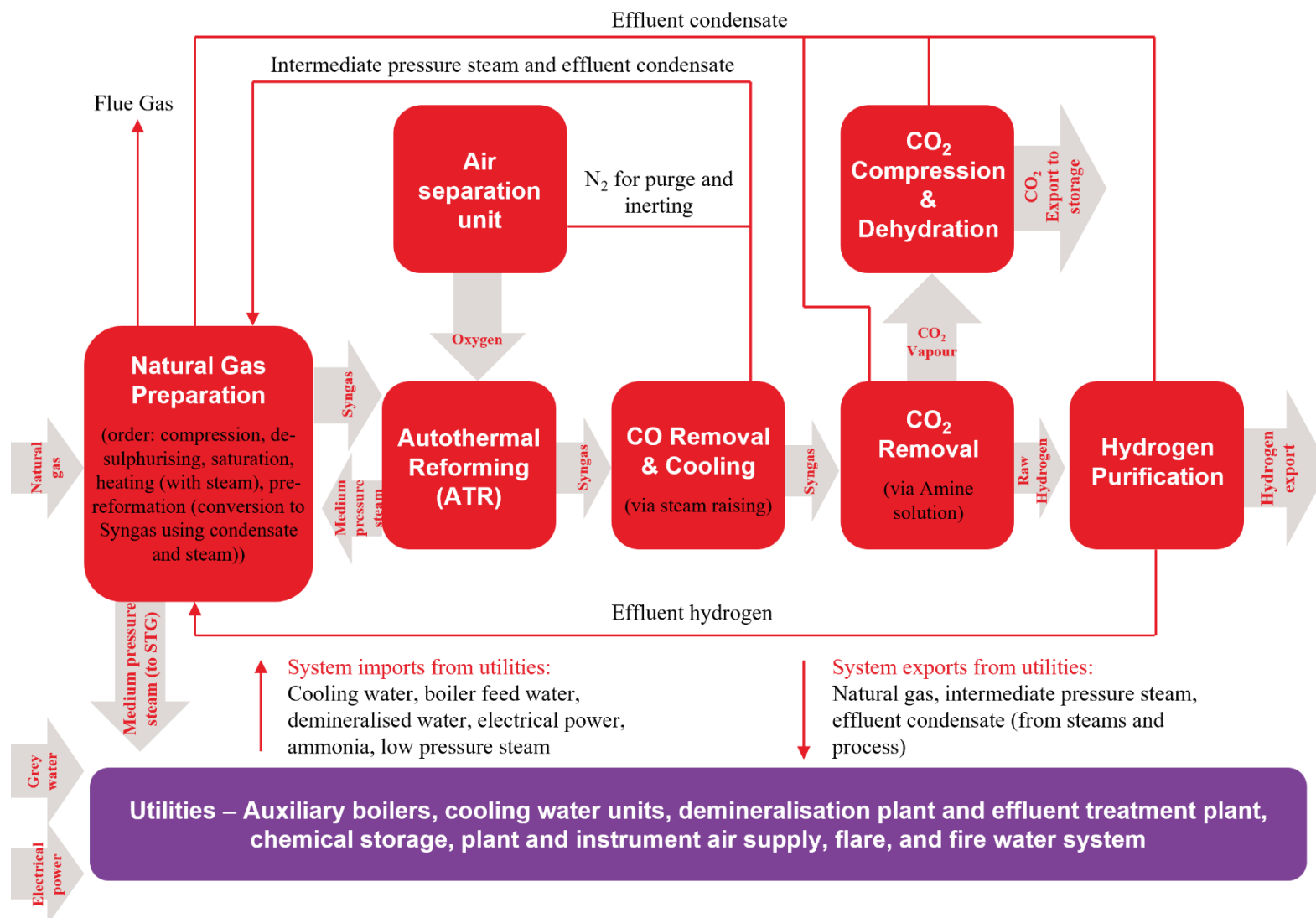
- feedstock supply: natural gas or a blend of natural gas and alternative fuel gas will serve as the initial feedstock;
- pre-treatment: the feedstock undergoes pre-heating before desulphurization, passing over a catalyst bed, to convert sulphur compounds into hydrogen sulphide (H₂S), which is then removed through adsorption;
- steam reforming: the treated gas undergoes a steam reforming reaction, converting natural gas or alternative fuel gas into a mixture of carbon monoxide (CO) and CO₂, H₂, and residual methane (CH₄) (syngas) in the presence of steam;
- cooling and water removal: the resulting gas is cooled, and water is removed, yielding a cool dry gas product;
- gas separation: the gas is divided into two streams which are:
 - CO₂ which will be removed through a closed loop two-stage absorption and stripping process designed to be capable of capturing at least 95% of the CO₂ emitted, in accordance with BAT. The CCP is subject to ongoing studies but is likely to use one or more CO₂ absorber columns to separate the CO₂ from the syngas mixture, CO₂ removal (stripper) and CO₂ conditioning and compression equipment; and
 - syngas without CO₂ which is further separated into gases including H₂, CO, CH₄, and N₂. This stage could use a PSA system if required to meet the required purified H₂ standard as a final product.

3.2.4 The outputs from the processes undertaken at the HPF are therefore:

- a low carbon purified H₂ gas stream which, following compression and metering, would be distributed into the gas distribution network via the Hydrogen Pipeline(s) for fuel-switching and blending by off-takers in hard to abate industries; and
- CO₂ produced by the reforming process which would be captured, compressed, and dehydrated so it is suitable for exporting via the proposed CO₂ T&S pipeline (by third-parties and/ or the NEP) for subsea geological sequestration.

3.2.5 A schematic of the production process is provided in Picture 3.

Picture 3.2: Indicative Process Schematic



3.2.6 To facilitate the H₂ production process in the HPF Area, the following ancillary infrastructure may be required:

- ASU, if required, for the separation of air, to produce O₂ for use in the gas reforming process and also includes provision of liquid O₂ and liquid N₂ storage for back up and start up;
- O₂ and N₂ supply pipelines (in-combination with, or as an alternative to the ASU) to supply O₂ and N₂ from third-party providers for the H₂ production process;
- auxiliary boiler(s) for process heating;
- a cooling water circulation system including cooling towers, pumps and circuit piping to supply cooling water (supplied to the Proposed Development via a tie-in to the existing non-potable pipeline network operated by NWL) where it is needed throughout the Proposed Development. This will require periodic replenishment due to losses from evaporation and blowdown;
- a flare which is currently anticipated to be up to 110 m height above existing ground level (AGL) for use in the event of emergencies to safely release any high-pressure components via controlled combustion;
- a fire water system consisting of a fire water supply (supplied by grey or raw water), pumps and fire water distribution system;
- chemical storage for additives required for the process and fuel such as biocides, disinfectants and ammonia, amongst others; and
- integration with the existing CATS Terminal including process controls.

3.2.7 Phase 2 of the Proposed Development may also include electricity generation infrastructure with a capacity in excess of 50MW. This could be either a natural gas-fired generating station or be fuelled by hydrogen. The primary purpose of the generating station would be to supply energy to the HPF although potentially, it may provide export capacity to the National Grid.

3.2.8 In addition, the following components and facilities will be incorporated into the layout of the HPF as required:

- main site entrance (main access with gated entry) as well as secondary access point(s) and emergency access;
- internal access roads;
- vehicle turning areas;
- internal and external storage areas;
- workshop and maintenance stores;
- a control room and administration buildings;
- car parking;

- fencing, security measures and operational lighting; and
- lorry holding and security inspection areas.

- 3.2.9 The majority of built structures associated with the Proposed Development are unlikely to exceed 50 m AGL. The design of Phase 2 (up to 2 trains) including the >50MW generating station is ongoing. It is currently envisaged that maximum parameters for built elements of Phase 2, including any turbine halls for the generating station, are likely to be similar to Phase 1 and will be confirmed as the design progresses. In addition to the flare, taller elements of Phase 1 and Phase 2 of the Proposed Development to be sited within the HPF Area will include emissions stacks, including those stacks for the auxiliary boiler(s) which are unlikely to exceed 65 m in height.
- 3.2.10 The design of the Proposed Development is following an iterative process, based on emerging designs for Phase 1 and preliminary environmental assessments. The design will also be informed by consultation and engagement with statutory and non-statutory consultees via the EIA Scoping Opinion process and planned non-statutory consultation.

Hydrogen Storage

- 3.2.11 The Proposed Development does not include on-site storage of H₂. If on-site H₂ storage becomes necessary, it is anticipated to be of a small-scale, pressurised nature and would be developed under a separate planning application and permitting process.
- 3.2.12 Off-site storage of H₂ is not included within the Proposed Development. If off-site storage becomes necessary, it is envisaged that such facilities would be owned and operated by a third-party provider, that would be responsible for any consenting requirements.

Material Storage

- 3.2.13 A number of chemicals will be required to be transported to, stored and utilised within the HPF Area. Some of these substances may be categorised as hazardous. The HPF Area will therefore contain chemical storage facilities including road tanker unloading areas.
- 3.2.14 In cases where a substance could potentially pose an environmental risk through uncontrolled release, such as via the surface water drainage system, appropriate containment facilities will be employed. These may include, but not be limited to, bunds and concrete surfaces designed and sized to meet their intended purpose.
- 3.2.15 An inventory of materials for storage at the HPF will be presented within the ES. If the storage of hazardous materials, either individually or in-combination, exceeds relevant thresholds, separate permissions will be

sought from the Hazardous Substances Authority, Health and Safety Executive (HSE), and local planning authority (LPA) for their storage in accordance with the Control of Major Accident Hazards (COMAH) and Hazardous Substance Consent regimes, respectively. All chemical storage activities will be subject to regulation by the Environment Agency through the acquisition of an environmental permit, which is mandatory for the operation of the Proposed Development.

Hydrogen Pipeline(s) and Above Ground Installations

- 3.2.16 Once H₂ is processed to the required specification and compressed within the HPF Area, a gaseous phase Hydrogen Pipeline network is required to connect the HPF to various potential industrial off-takers across the Tees Valley. The Proposed Development could utilise a number of routes to connect to potential H₂ off-takers, therefore as described in paragraph 2.2.15, the Hydrogen Pipeline routing is currently indicative, and corridors are broad to allow for further refinement following completion of ongoing technical and commercial studies. Additional off-taker spurs, if required, would be consented separately.
- 3.2.17 Two potential connection routes are included within the Hydrogen Pipeline (east) to cross the Seal Sands area, prior to the River Tees crossing where a wider corridor is currently under consideration to provide flexibility in the chosen construction methodology (described in paragraphs 3.2.22 - 3.2.24). Options for routing the Hydrogen Pipeline (east) are also included in the Wilton Site to allow the connection to future off-takers. Two potential connection routes are currently included within the Hydrogen Pipeline (west) around Cowpen Bewley to provide flexibility for pipeline routeing.
- 3.2.18 The Hydrogen Pipeline will have an approximate 20-inch diameter and a maximum operating pressure (MOP) of up to 93 barg and include the following pipelines to connect to potential off-takers:
- Hydrogen Pipeline (west) - approximately 6.6 km in length and 20" in diameter;
 - Hydrogen Pipeline (east) - approximately 9.6 km in length and 20" in diameter;
 - Hydrogen Pipeline (west) (customer spur pipeline 1) - approximately 560 m in length and 10" in diameter;
 - Hydrogen Pipeline (east) (customer spur pipeline 2) - approximately 440 m in length and 6" in diameter; and
 - Hydrogen Pipeline (east) (customer spur pipeline 3) - approximately 1.1 km in length and 10" in diameter.
- 3.2.19 Each of these options is assessed in this EIA Scoping Report. Indicative

routing of the Hydrogen Pipeline including customer spur pipelines is illustrated on Figure 3.1 (Appendix A).

- 3.2.20 It is anticipated that the Hydrogen Pipeline(s) will be installed predominantly below ground, with above ground elements limited to where existing pipe racks can be utilised and where off-taker connections are required, although this is subject to further design development and the final design will be confirmed in the ES that accompanies the Application.
- 3.2.21 A number of AGI will be required along the Hydrogen Pipeline(s) to enable potential off-takers to connect to the hydrogen distribution system. Their locations and maximum dimensions will be detailed within the ES.

River Tees Crossing

- 3.2.22 The Hydrogen Pipeline will require a crossing of the River Tees via an existing tunnel, repurposing of an existing pipeline or alternatively via a new crossing below the bed of the River Tees. At this early stage in the design and assessment process, a broad corridor is under consideration applying the Rochdale Envelope approach for the Hydrogen Pipeline crossing of the River Tees. It is anticipated that this corridor, and optionality, will be refined down prior to submission of the Application.
- 3.2.23 The Applicant's preferred option is for the installation of the Hydrogen Pipeline and Effluent Connection Corridor pipeline within an existing tunnel. Any tunnel would be a minimum of >10 m below the riverbed level. Any works to install the Hydrogen Pipeline and Effluent Connection Corridor pipeline within such a tunnel would therefore take place below MHWS, and no in-water works including drilling or piling would be required in the marine environment within the River Tees.
- 3.2.24 Alternative trenchless crossing methods such as a new horizontal directional drilled (HDD) or microbore tunnel (MBT) crossing, or re-use of an alternative tunnel crossing/ repurposing of an existing pipeline also remain under consideration. In the event that such crossings are used, it is anticipated that the locations of entry and exit pits would be above MHWS and no drilling or piling would be required in the marine environment.
- 3.2.25 An indication of the proposed construction activities for the Hydrogen Pipeline including River Tees crossing are described in Section 3.3.

CO₂ Export Connection

- 3.2.26 An approximately 500 m length and 16" in diameter CO₂ piping connection will transport the captured CO₂ emissions from the HPF to a CO₂ AGI, proposed to be located within the existing CATS Terminal. It is currently envisaged that captured CO₂ emissions following compression would be

directed to the consented NEP CO₂ Pipeline. NEP would then be responsible for the onward T&S of CO₂. The options under consideration are illustrated on Figure 3.1 (Appendix A).

Natural Gas Supply Connection

3.2.27 The proposed natural gas supply to the Proposed Development will be via a tie-in connection from either (or a combination of):

- the Applicant's existing gas pipeline within the CATS Terminal, anticipated to be approximately 180 m in length and 24" in diameter; and/or
- a tie-in to the NTS AGI, located within the existing CATS Terminal boundary.

Electrical Connection

3.2.28 A new connection will be required to supply electricity to the HPF during Phase 1 and Phase 2 of the Proposed Development. It is anticipated that this will comprise a new up to 132kV electrical connection cable (approximately 1.3 km in length) from the existing incoming terminals of Seal Sands grid transformers, downstream of the National Grid Saltholme Substation. The electricity demand for Phase 2 may require grid reinforcement. As timescales for such third party works are not within the Applicant's control, the Proposed Development also includes the option for on-site electricity generation. Works to install two below ground cables would be undertaken by NPG as distribution network operator (DNO), or an approved NPG contractor.

Water Connections

3.2.29 Water supply and discharge connections are required for the process at the HPF including for cooling water purposes and discharge of treated effluent. These are detailed below.

Raw Water

3.2.30 Raw water will be supplied to the HPF via a new tie-in to the existing non-potable pipeline network operated by NWL that currently supplies the existing CATS Terminal. The proposed tie-in will be approximately 500 m in length and 8" in diameter and its indicative routing within the Shared Pipeline Corridor is illustrated on Figure 3.1 (Appendix A).

Process Effluent

3.2.31 Effluent discharges from the H₂ production process will be regulated by the Environment Agency through the Environmental Permit required for the

operation of the Proposed Development. It is envisaged that effluent would be transported off-site via a new dedicated effluent pipeline to the existing Bran Sands Water Treatment Facility east of the River Tees. It is currently anticipated that the effluent pipeline will be approximately 6 km in length and 8" in diameter, following the indicative routing of the Hydrogen Pipeline (east) up to the tie-in point at Bran Sands Water Treatment Facility, as illustrated on Figure 3.1 (Appendix A).

Drainage

- 3.2.32 Consistent with the arrangements for the existing CATS Terminal, the Proposed Development will incorporate a surface water drainage system. Surface water will be appropriately segregated, treated and attenuated (in a new tank/ pond or similar) prior to discharge to Greatham Creek. A conceptual drainage strategy is currently being developed and following technical engagement with relevant stakeholders, will accompany the Application.

Wastewater and Drainage

- 3.2.33 A number of potential sources of wastewater may arise from the Proposed Development including grey water from the proposed HPF administration buildings.
- 3.2.34 Existing CATS Terminal treated wastewater (and surface water runoff) streams are currently discharged, following attenuation, to Greatham Creek, via an existing reedbed treatment system. As part of the Proposed Development, it is currently anticipated that this existing reedbed could be removed and a replacement reedbed system installed, designed and sized to treat the existing CATS Terminal and Proposed Development grey water streams. This is subject to further design development. Proposed arrangements for wastewater streams will be described in the conceptual drainage strategy accompanying the Application.
- 3.2.35 It is currently anticipated that the Wastewater Connection Corridor pipeline would be approximately 1.1 km in length and 8" in diameter with indicative routing illustrated on Figure 3.1 (Appendix A). Pre-application discussions are proposed with relevant regulatory bodies to agree the principles of the conceptual drainage strategy, including allowable discharge rates and treatment requirements.

Access

- 3.2.36 Permanent access to the Proposed Development Site during operation would be via the A1185 (Seal Sands Link Road) and the North South Access Road.

Hours of Operation/ Staffing

- 3.2.37 The HPF will be designed to operate 24 hours per day, 7 days per week with programmed offline periods for maintenance.
- 3.2.38 Operation of the Proposed Development is anticipated to create up to 70 permanent operational roles (in the event that all three trains are built out); i.e. an additional 40 - 50 roles for Phase 1 and an additional 10 - 20 roles for Phase 2.
- 3.2.39 During Phase 1 of the Proposed Development, the existing CATS Terminal operational workforce (approximately 80 personnel) would therefore increase to 120 – 130 workers, deployed on a shift basis, serving both the existing CATS Terminal and HPF allowing for synergies of operations and control philosophy. Following construction of Phase 2, the total workforce could increase to 130 – 150 staff employed on-site serving the existing CATS Terminal and HPF.
- 3.2.40 Temporary and contractor employees associated with maintenance activities would also be employed, as required. During major turnarounds/ planned maintenance periods, which could typically occur for approximately 1 month every 4 years (per train), it is envisaged that there could be up to 150 - 200 additional/ temporary personnel on-Site, depending on the scope of maintenance required. Such short-duration planned maintenance activities would be planned to not coincide with those of the existing CATS Terminal.

Operational Heavy Goods Vehicle Movements and Traffic

- 3.2.41 Once operational, staff will be required on a shift basis, to be spread over a 24-hour period. Assuming a 12-hour shift pattern, and conservatively assuming a car occupancy of one, this could equate to an additional 140 staff vehicle movements (i.e. 70 vehicles in/ out accessing the Proposed Development Site per day). In addition, some heavy goods vehicle (HGV) movements associated with delivery of consumables and removal of waste products are anticipated.

Operational Lighting

- 3.2.42 An Indicative Lighting Strategy will accompany the Application. External lighting will be designed to provide safe working conditions in all relevant areas of the Proposed Development Site whilst reducing light pollution and the visual impact on the local environment. The external lighting scheme will be designed to accord with relevant standards including the Guidance Notes for the Reduction of Obtrusive Light (2021) published by the Institute of

Lighting Professionals¹⁸ and/ or Chartered Institution of Building Services Engineers (CIBSE) requirements.

3.3 Construction Activities

Preliminary Works including Site Clearance

- 3.3.1 The preliminary works required are the subject of ongoing studies and would be confirmed in the ES that accompanies the Application; however, it is currently envisaged that the HPF Area will initially require site clearance (including removal of vegetation), bulk earthworks and preparation for the temporary construction facilities installation. Imported materials will be used to bring the HPF Area up to grade level. Additionally, a number of off-site services (e.g. potable water, lighting, fibre connection) will require installation for the construction offices and welfare facilities. It is assumed that the above and below ground structures currently on the HPF Area will be removed, cleared and remediated to a suitable development platform level, including redundant services, where present.
- 3.3.2 The planned site clearance works include removals of:
- the existing reedbed and associated ponds (subject to ongoing development design);
 - a redundant vent/ flare stack;
 - existing street furniture (lamp posts and lighting);
 - historic construction power distribution equipment and associated underground cables;
 - site fencing;
 - existing roads and concrete hardstanding; and
 - other redundant underground services.
- 3.3.3 Given the previous history of the HPF Area as reclaimed land/ CATS Terminal construction laydown and previous/ existing industrial land-uses along the route of the Hydrogen Pipelines, it is possible that subsurface contamination may be present. As described in Section 6.6, a preliminary intrusive ground investigation (GI) has already been carried out within part of the proposed HPF Area in 2022/ 2023 and further targeted soil and groundwater investigation would be undertaken in other areas prior to commencing construction. The design and extent of this GI would be based on the final design for the Proposed Development and would be conducted

¹⁸ Institute of Lighting Professionals (2021) The Reduction of Obtrusive Light. Available at: <https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2021/> [Accessed 24/01/2025].

to also provide the necessary information to inform the requirements of the environmental permit.

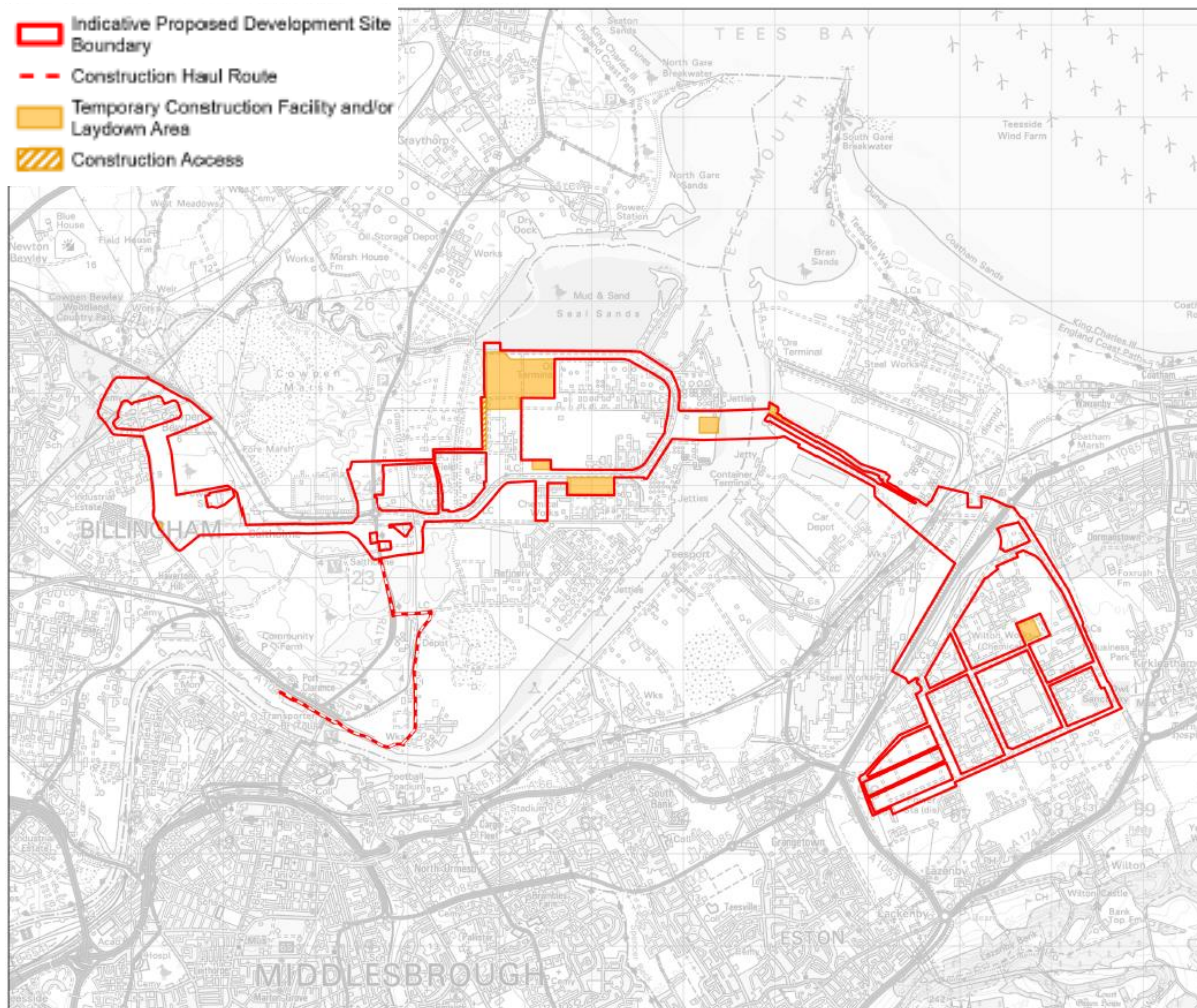
- 3.3.4 Although there is the possibility of ground contamination in the HPF Area as it was previously reclaimed from the historic steelworks in the area, the GI undertaken to date on the proposed HPF Area has encountered generally very low concentrations of contamination in soils and groundwater, except for low concentrations of asbestos associated with local demolition materials within made ground.

Earthworks

- 3.3.5 Earthworks will be required to reprofile areas of the HPF Area, to produce a level platform, excavate foundations for the Proposed Development and/ or remove surplus material or remediate any contaminated soil. A flood risk assessment (FRA) will accompany the Application and will inform any minimum development platform elevation to minimise the risk of flooding (allowing for climate change) and the need for any targeted changes to site levels. The ES will describe the anticipated cut and fill volumes, spoil movements, minimum and, where relevant, maximum final ground heights and the associated impacts (e.g. construction traffic volumes).
- 3.3.6 Any excess spoil generated during construction will be managed through the site waste management plan (SWMP) that would form part of the Final Construction Environmental Management Plan (CEMP).

Indicative Construction Laydown Areas and Contractor Compounds

- 3.3.7 Laydown areas required will depend upon the preferred construction approach of the appointed engineering, procurement and construction contractor(s) and will be confirmed following detailed design, taking into consideration relevant constraints. A laydown area required temporarily during construction of the HPF will be located within the HPF Area and may be used for equipment and material storage, site offices/ welfare facilities, batch concrete facilities, soil storage/ waste handling areas etc. and internal temporary access routes and parking areas.
- 3.3.8 There will be additional laydown areas at various locations to facilitate the construction of the Hydrogen Pipeline(s). These areas will be used for the temporary storage of materials, fabrication, welfare facilities etc. Indicative construction laydown area locations are shown on Figure 3.2 (Appendix A) reproduced in Picture 3.3 and the final number and location of construction laydown areas will be identified within the ES.

Picture 3.3: Indicative Construction Laydown Areas and Access

- 3.3.9 Construction traffic (workers and HGV) is expected to access the Proposed Development Site via the A1185 Seal Sands Road and the North South Access Road from the surrounding network. Initial discussions with SBC have confirmed that this is an established HGV priority route, with no known current capacity or safety issues.
- 3.3.10 During the detailed design stage, the approach to construction will be refined. Several routes are under consideration to be used for the shipborne delivery of large plant and equipment (abnormal indivisible loads (AIL)) during construction of the Proposed Development. Further detail will be provided in the ES. These AIL would be transported to the HPF Area using the existing road network.
- 3.3.11 It is currently anticipated that the existing wharf at Wilton Engineering, Port Clarence could be a preferred offloading area for modular plant. The approximate 4.1 km route for transportation of AIL i.e. 'the Construction Haul Route' from the temporary construction laydown facility at Port Clarence to the HPF Area is shown on Figure 3.2 (Appendix A) reproduced in Picture 3.3; the majority of the route is a private road before joining Seaton Carew

Road and Seal Sands Road towards the existing site access. The strategy and routes for delivery of AIL will be subject to further assessment to determine any modifications that may be required to existing infrastructure to allow conveyance of the largest AIL. Powers for such works may be sought in the DCO or negotiated by voluntary agreement where on third-party land. The ES will assess the impacts and effects of any proposed modifications.

- 3.3.12 A construction traffic management plan (CTMP) and construction worker management plan (CWMP) will form part of the embedded mitigation for the Proposed Development and framework versions of these documents will be prepared to accompany the Application, providing an overview of proposed construction (including AIL) traffic routes and associated management measures, including proposals for management of any affected PRoW. A draft of these framework management plans will be provided to relevant highway authorities for agreement during the Application, prior to its submission.

Main HPF Works

- 3.3.13 Standard construction practices will be utilised for the construction of the HPF. Piled foundations are likely to be required for certain components including new pipe racks and foundations for major equipment. Piling design would be undertaken at detailed design stage and informed by further GI. The ES will assess the impacts and effects of piling, as required, including potential noise and vibratory impacts to birds and other species, given the proximity of sensitive habitats adjacent to the HPF Area.

Hydrogen Pipeline Works

- 3.3.14 Standard open-cut construction methodologies will be utilised for the installation of any below ground pipeline sections where possible. This will involve installation of a temporary fenced working area along the working width, vegetation clearance, stripping of topsoil and storage for later reinstatement and excavation. Subsoil will be stored separately to topsoil and used for backfill over the installed pipeline.
- 3.3.15 Typically, the pipeline would be lowered into the trench using excavators onto a layer of bedding material followed by a layer of backfill which is then compacted. Pipeline integrity would then be confirmed via a hydrotest in accordance with national standards and testing undertaken in accordance with recognised standards to confirm the pipeline is suitable for use, prior to the reinstatement of the topsoil and removal of temporary fencing.
- 3.3.16 Any above ground pipeline sections will be installed with a comparable working width. Supporting foundations and structures will be installed within

the working width and the sections of pipeline will be lifted into place, welded and tested prior to site reinstatement.

- 3.3.17 Piled foundations may be required for certain components of the Hydrogen Pipeline within the Proposed Development Site, including for any new pipe bridges. Piling design would be undertaken at detailed design stage and informed by GI, where required. The ES will assess the impacts and effects of piling, as required.
- 3.3.18 The route of the Hydrogen Pipeline will require multiple crossings of features with environmental sensitivity including watercourses and habitats sites, as well as crossings of existing infrastructure (roads, utilities, industrial pipelines etc.). Table 3.1 summarises the construction methodologies being considered for crossings and provides an early indication of the number of each that may be anticipated, subject to further design development.

Table 3.1: Construction methodologies being considered for crossings

Construction methodology	Description of the construction methodology	Potential number of crossings
Open cut trench	Requires the surface of the ground to be opened to a required depth for a pipeline to be installed in the excavated trench. Once complete, the trench is backfilled, and the surface restored to the original/ an agreed condition. Will be used as the standard construction methodology for the Hydrogen Pipeline route, where reasonably practicable. Its use will be dependent upon local sensitivities and available space to store temporarily excavated material.	24
Thrust boring	Generally consists of an auger with a cutting head being placed inside a steel casing and laid against the wall of an entry pit. The cutting head rotates, drilling the soil and removing the spoil, while a jacking rig thrusts the casing and auger to the exit pit. After the auger and steel casing have reached the exit pit, the product pipe is installed within the complete bore. This trenchless boring method will be employed where open cut trenching is not appropriate and there is no requirement to use horizontal directional drilling (HDD).	42
Horizontal directional drilling	Technique whereby a tunnel is drilled under a waterway or other designated feature, following an arc line from the entry point, down under the feature to be crossed, and then resurfacing on the opposite side. The pipeline is then pulled through the drilled underground tunnel and welded together with the rest of the pipeline system.	4

Construction methodology	Description of the construction methodology	Potential number of crossings
	Trenchless crossings via HDD are being considered in several environmentally sensitive locations in addition to the River Tees crossing if existing tunnels are not suitable.	
Utilising existing pipeline corridors and other pipeline infrastructure	Re-use of existing pipeline corridors is a way in which the construction phase impacts can be minimised. This is the preferred approach for crossing the River Tees.	1

3.3.19 The selection of the final Hydrogen Pipeline routes and construction methodology is the subject of ongoing technical studies, that will be informed by the EIA as this progresses.

River Tees Crossing

3.3.20 A number of options are under consideration for the River Tees crossing within the route of the Hydrogen Pipeline (east). The Applicant's preferred option for the crossing of the River Tees is to re-use existing pipeline corridors to minimise construction phase impacts.

3.3.21 In the event that an existing tunnel is used, similar methods to those used to install previous pipelines would be anticipated i.e. existing access and egress points to the tunnel would be strengthened to enable construction to commence, the tunnel would require dewatering, existing pipelines that are no longer in use would be removed and the Hydrogen Pipeline and Effluent Connection Corridor pipelines would then be installed. Existing operational pipelines will be protected, as necessary during the works.

3.3.22 The proposed construction works would utilise existing access shafts and above ground entrance points on either side of the River Tees for all installation related works. The diameter of existing tunnels are anticipated to be adequate for the required equipment and machinery without modifications or special access arrangements. No works will therefore be required within the water column of the River Tees.

3.3.23 Water from the dewatering activities would either be discharged to the River Tees following treatment in a filtration system or transported off-site via tanker to a licensed water treatment facility.

3.3.24 In the event that repurposing of an existing pipeline is pursued, it is anticipated that construction works would be limited to the installation of new piperacks and works compounds onshore.

3.3.25 In the event that alternative trenchless crossing methods such as a new HDD or MBT crossing below the River Tees is required, a minimum depth of approximately 30 m (at the deepest point of crossing) is envisaged to

prevent impacts on river channel integrity. Land either side of the crossing will be required for launch and pipeline stringing including relevant construction activities.

Site Restoration/ Reinstatement

- 3.3.26 Restoration and reinstatement activities for land that is temporarily disturbed during construction would commence as soon as reasonably practicable and typically be completed within 6 – 12 months. Depending on the sequencing of construction activities for Phase 1, earlier reinstatement /restoration may be possible in the Hydrogen Pipeline, Water Connection Corridor, and the Proposed CO₂ Export Connection Corridor (if required), depending on the construction activities that may be required for Phase 2. Restoration and reinstatement activities for the smaller area of land within the HPF Area (including associated construction areas) that is temporarily disturbed during Phase 2 would commence following completion of construction.
- 3.3.27 Following construction, plant and equipment will be removed and existing ground reinstated. Topsoil would be reinstated where this has been stored during construction following topsoil stripping. The overall objective will be to leave the areas of the Proposed Development Site required only for construction with no residual environmental and/ or safety risks and return the land to a condition suitable for re-use.

Biodiversity Net Gain

- 3.3.28 Landscaping and ecological management will be provided as appropriate following restoration. Technical work will be undertaken as part of the Application to quantify the change in biodiversity units predicted to arise from the Proposed Development, with the overall objective to achieve a net gain in biodiversity via habitat restoration, enhancement and creation.
- 3.3.29 The Applicant intends to comply with any mandatory BNG targets for NSIP projects which are expected to be implemented from November 2025, prior to submission of the Application. A landscape and biodiversity management and enhancement plan (LBMEP) will accompany the Application.

3.4 Construction Programme

- 3.4.1 Construction of the Proposed Development is expected to take place in two phases. Phase 1 of the Proposed Development (subject to the necessary consent being granted and an investment decision being made) may commence in 2027, and the construction phase would last approximately four years. The construction of Phase 2 of the HPF together with associated development, may follow on with a construction phase of approximately four

years per train. The ES will provide further details of the proposed construction activities and their anticipated duration, along with an indicative programme for each phase of the works.

3.5 Construction Workers

- 3.5.1 Based on initial estimates, it is considered that there could be approximately 550 workers contracted to work at the peak of construction during Phase 1 with similar numbers during the peak of construction activities for Phase 2. The ES will consider the maximum number of construction workers likely during the peak of construction.

3.6 Construction Vehicle Movements

- 3.6.1 The volume of worker vehicles on the network is predicted to be at its maximum of around 1,100 two-way daily vehicle movements (550 arriving and 550 departing) during the peak of construction activities for Phase 1 and Phase 2, using a conservative car occupancy of one vehicle per worker.
- 3.6.2 The volume of HGV on the network is predicted to be at its maximum approximately 150 one-way HGV movements per day during the peak civil engineering works period.
- 3.6.3 The above figures are indicative and based upon the available information at this scoping stage and will be reviewed and updated as further information is available as the Proposed Development design evolves.

Construction Management

- 3.6.4 The ES will be supported by a Framework CEMP, which will describe the mitigation measures to be followed to reduce impacts on the environment during the construction phase. The Framework CEMP will be developed considering the environmental assessments including mitigation measures presented in the ES and will include, but not be limited to impacts from:
- construction traffic (including parking and access requirements);
 - earthworks;
 - noise and vibration;
 - dust generation;
 - biodiversity management;
 - water resources, flooding and drainage; and
 - waste generation.
- 3.6.5 The Final CEMP will be secured by a requirement of any DCO that is granted and will identify the relevant procedures to be adhered to throughout

construction.

- 3.6.6 Contracts with companies involved in the construction works will incorporate environmental control, health and safety regulations and current guidance with the intention that construction activities are sustainable and that all contractors involved with the construction stages are committed to agreed best practice and meet all relevant environmental legislation including:
- Control of Pollution Act 1974 (COPA)¹⁹, Environment Act 1995²⁰ and 2021²¹; and
 - Hazardous Waste (England and Wales) Regulations 2005²², and Environmental Permitting (England and Wales) Regulations 2016²³.
- 3.6.7 All construction works will adhere to the Construction (Design and Management) (CDM) Regulations 2015²⁴.

3.7 Operational Environmental Management and Maintenance

- 3.7.1 The HPF will require an Environmental Permit, and adherence to the Environmental Permitting (England and Wales) Regulations 2016 ('EPR')²³ will be required so that any impacts of emissions to air, soil, surface and groundwater, to the environment and human health will be minimised and avoided using BAT as far as reasonably practicable. Whether a new permit, or a variation to the existing permit for the existing CATS Terminal, is progressed and the timing of the permit application will be discussed and agreed with the Environment Agency prior to submission of the Application.
- 3.7.2 The Proposed Development will be operated in line with appropriate standards and the operator will implement and maintain an environmental management system (EMS) certified to International Standards Organisation (ISO) 14001²⁵. The EMS will outline the requirements and procedures essential for maintaining the Proposed Development Site at the prescribed standard.
- 3.7.3 In accordance with the Environmental Permit, any requirements for sampling and analysis of pollutants will be undertaken.
- 3.7.4 Rights of access for the operator to access the Hydrogen Pipeline during operation of the Proposed Development for the purposes of maintenance

¹⁹ UK Government (1974) Control of Pollution Act 1974

²⁰ UK Government (1995) Environment Act 1995.

²¹ UK Government (2021) Environment Act 2021.

²² UK Government (2005) The Hazardous Waste (England and Wales) Regulations 2005.

²³ UK Government (2016) Environmental Permitting (England and Wales) Regulations 2016.

²⁴ UK Government (2015) The Construction (Design and Management) Regulations 2015.

²⁵ ISO (2015) Environmental Management Systems. Available at: <https://www.iso.org/standards/popular/iso-14000-family> [Accessed 24/01/2025].

will be secured via necessary easements/ land agreements.

3.8 Decommissioning

- 3.8.1 Each train of the HPF is expected to have a design lifespan of approximately 25 years. The operational life of each train may extend beyond this depending on market conditions and the condition of plant and equipment. An investment decision would then be made based on the market conditions prevailing at that time. Therefore, an appropriate assessment period will be used for each topic which considers the expected operational life. The Hydrogen Pipeline(s) are expected to have a design lifespan of approximately 50 years, although the operational life may be longer.
- 3.8.2 Upon reaching the eventual end of its operational life, the most likely scenario involves the cessation of the Proposed Development, with the removal of all above ground structures and necessary ground remediation for potential future re-use. The Applicant will conduct an assessment at that time to determine whether any infrastructure should be retained for future purposes, with similar considerations applied to the H₂ pipelines within the Hydrogen Pipeline(s) and utility connections.
- 3.8.3 A Decommissioning Plan, inclusive of a decommissioning environmental management plan (DEMP), will be developed and agreed with the Environment Agency as part of the EPR site surrender process. The DEMP will consider all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be eliminated or mitigated.

3.9 Consideration of Alternatives

Introduction

- 3.9.1 The EIA Regulations require that an ES should include an outline of the reasonable alternatives that have been studied by the Applicant and an indication of the main reasons for its choices, taking into account differences in environmental effects. Under the EIA Regulations there is no requirement to assess alternatives, only a requirement to provide a review of those alternatives that have been considered.

The Do-Nothing Alternative

- 3.9.2 The 'Do-Nothing' alternative would be where the Proposed Development would not be developed, meaning that the opportunity for industrial off-takers to transition utilising H₂ piped directly to their facilities would not be readily available and they may continue to use or opt for more carbon intensive alternatives. This would put at risk the UK Government's policy ambition of 10GW of low carbon H₂ production by 2030 and further

ambitions to then scale up low carbon hydrogen deployment beyond this in the transition to a low carbon economy.

- 3.9.3 In addition, low carbon hydrogen is recognised as being essential to meeting commitments the UK Government has made to achieving net zero and has been determined as critical national priority (CNP) for the provision of nationally significant low carbon energy infrastructure in Overarching National Policy Statement (NPS) EN-1²⁶. Please see Section 4.2 for further detail. The Proposed Development through its links to the NEP development will contribute to and facilitate the path towards net zero in the UK. The ‘Do-Nothing’ alternative scenario is therefore discounted on the basis that there is a clear need for the Proposed Development.

Site and Design Alternatives

- 3.9.4 A number of sites within Teesside were considered by the Applicant for the location of the HPF. The existing CATS Terminal was selected as it is a brownfield site, which is remote from residential and other safety sensitive receptors. It is also within the control of the Kellas group which removes the requirement to procure a new site. Locating the Proposed HPF within the existing CATS Terminal boundary also allows the Applicant to take advantage of the benefits of co-location in terms of shared facilities, access, etc. and potential integration of the operation of the two facilities as a single COMAH site.
- 3.9.5 The existing CATS Terminal benefits from excellent links to existing infrastructure including access to an on-Site natural gas supply, avoiding the need for new gas connection pipelines. Additionally, the existing CATS Terminal has access to water and transport infrastructure, therefore minimising the extent of the construction works, and disturbance required to enable the Proposed Development. It is also proximal to the NEP infrastructure that once developed, will allow captured CO₂ from the Proposed Development to be transported for permanent storage underground in the Southern North Sea.
- 3.9.6 Two alternative development plots within the existing CATS Terminal were evaluated for the siting of Phase 1, considering safety, operability, cost and environmental factors. It was concluded that locating Phase 1 closer to the existing CATS Terminal would offer advantages, including integration of the HPF control room as well as reductions in pipework length, groundwork and civil works and cabling. Both plots were similar in terms of environmental considerations, although the Phase 1 selected plot was located slightly

²⁶ Department for Energy Security and 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> [Accessed 24/01/2025].

further from sensitive environmental designations (Teessmouth and Cleveland Coast Ramsar, SPA and SSSI). A FEED study was then undertaken to determine the scale and layout of a 355MW Train on the selected plot; this design and layout work is now complete.

- 3.9.7 Alternative route options for the Hydrogen Pipeline(s) have been considered, and continue to be evaluated, considering the location of potential hydrogen off-takers and engineering, constructability, land and environmental constraints and opportunities. Further detail will be provided in the ES following ongoing route definition and refinement.
- 3.9.8 The remaining available land within the existing CATS Terminal has been selected for Phase 2 to make best use of synergies between the two development phases. Alternative layouts are being evaluated for Phase 2 with additional supporting infrastructure, considering the need for, proximity to and potential synergies with Phase 1 as well as environmental considerations (including closer proximity to Teessmouth and Cleveland Coast Ramsar, SPA and SSSI).
- 3.9.9 It is proposed that the alternatives will be considered, and options refined as the Application progresses including (but not limited to):
- number and siting of temporary construction laydown areas;
 - the layout of Phase 2 of the HPF including the configuration of the structures and buildings;
 - inclusion of self-generation/ export capacity for the Proposed Development and choice of technology for the > 50MW generating station and carbon capture for the HPF;
 - the capacity of trains in each of Phases 1 and 2;
 - the options, extent and refinement of routing for the Hydrogen Pipeline(s), including the method of crossing the River Tees; and
 - the options for treating wastewater within HPF Area prior to discharge via the Water Connection Corridor.
- 3.9.10 Where alternatives are examined and assessed during the pre-application process, details of the options and reasons for selection (or otherwise) will be included within the ES for the Proposed Development.
- 3.9.11 Where, at the time of the Application, alternatives still exist for any particular element of the Proposed Development, the assessments to be included within the EIA and presented in the ES will consider and assess the 'worst-case' impacts in accordance with the Rochdale Envelope approach outlined in Section 3.1.

4 Planning Policy

4.1 Introduction

- 4.1.1 This chapter provides an overview of the planning policies relevant to the Proposed Development. This includes national, regional and local planning policy and marine policy. The Application will include a Planning Statement that will set out in more detail the relevant policies and include an assessment of how the Proposed Development complies with these policies.
- 4.1.2 The HPF is located within the administrative boundary of SBC. The Hydrogen Pipeline(s) and other connections involve a crossing of the River Tees and therefore the Proposed Development encompasses land within the administrative boundaries of both SBC and RCBC.
- 4.1.3 The planning policy documents relevant to the Proposed Development include:
- NPS EN-1 for Energy (January 2024)²⁶;
 - National Planning Policy Framework (NPPF) (updated December 2024)²⁷;
 - UK Marine Policy Statement (MPS) (March 2011)²⁸;
 - North East Inshore and North East Offshore Marine Plan (June 2021)²⁹;
 - SBC Local Plan (adopted January 2019)³⁰; and
 - RCBC Local Plan (adopted May 2018)³¹.

4.2 National Policy

National Policy Statements

- 4.2.1 The policy framework for examining and determining applications for NSIP is provided by NPS. DESNZ published updated NPS documents in January

²⁷ Ministry of Housing, Communities and Local Government (2024) National Planning Policy Framework. Available at: <https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf> [Accessed 24/01/2025].

²⁸ UK Government (2011) UK Marine Policy Statement. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf [Accessed 24/01/2025].

²⁹ UK Government (2021) North East Inshore and North East Offshore Marine Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/995743/FINAL_North_East_Marine_Plan.pdf [Accessed 24/01/2025].

³⁰ Stockton-on-Tees Borough Council (2019) Local Plan. Available at: <https://www.stockton.gov.uk/local-plan> [Accessed 24/01/2025].

³¹ Redcar & Cleveland Borough Council (2018) Local Plan. Available at: <https://www.redcar-cleveland.gov.uk/planning/local-plan/redcar-and-cleveland-local-plan> [Accessed 24/01/2025].

2024. The following NPS are expected to be important and relevant to the SoS determination of the Application for the Proposed Development.

Overarching National Policy Statement for Energy (NPS EN-1)²⁶

- 4.2.2 NPS EN-1 sets out the Government's overarching national policy with regards to the development of NSIP in the energy sector. NPS EN-1 is underpinned by the principle that there will be a need for significant amounts of new large-scale energy infrastructure to meet the Government's energy objectives. It states at paragraph 2.16 that large-scale energy infrastructure *"will be required to ensure the UK can provide a secure, reliable and affordable supply of energy, while also meeting our decarbonisation targets."*
- 4.2.3 Part 3 of EN-1 sets out the need for nationally significant energy infrastructure. Paragraph 3.1.1 states that the *"government sees a need for significant amounts of new large-scale energy infrastructure to meet its energy objectives"* and that the *"government does not consider it appropriate for planning policy to set limits on different technologies but planning policy can be used to support the government's ambitions in energy policy and other policy areas"* (Paragraph 3.2.4).
- 4.2.4 Paragraph 2.3.7 states that low carbon hydrogen will likely play an increasingly significant role in meeting energy demand by 2050, requiring the integration of new low carbon hydrogen into the network. EN-1 (paragraph 4.2.5) recognises that low carbon hydrogen infrastructure is CNP infrastructure which is essential to meeting commitments the UK Government has made to achieving net zero.

National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (NPS EN-2)³²

- 4.2.5 NPS EN-2 outlines the factors, such as those affecting site selection, and the specific considerations related to assessment and technology, including relevant environmental issues, that should be considered when preparing and evaluating applications for natural gas-fired electricity generating infrastructure. It is also applicable to hydrogen gas-fired electricity generating infrastructure.
- 4.2.6 NPS EN-2 also states (at paragraph 1.1.2): *"The majority of new generating capacity will need to be low carbon. But new unabated natural gas*

³² Department for Energy Security and Net Zero (2024) National Policy Statement for natural gas electricity generating infrastructure (EN-2). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-natural-gas-electricity-generating-infrastructure-en-2> [Accessed 24/01/2025].

generating capacity will also be needed during the transition to net zero. This will ensure that the system remains reliable and affordable.”

National Policy Statement for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (NPS EN-4)³³

- 4.2.7 NPS EN-4 is specifically relevant to address natural gas infrastructure and does not directly apply to hydrogen infrastructure projects. However, as stated in paragraph 1.6.6 of NPS EN-4, it may still be relevant to the SoS decisions on applications for such developments:

“The guidance that follows in this NPS has been drafted in respect of, and has effect only in relation to, natural gas infrastructure. It does not have effect for hydrogen infrastructure, but may be part of other matters which the Secretary of State thinks are important and relevant to their decision on applications for hydrogen infrastructure, in which case they would need to take it into account.” NPS EN-4 acknowledges the role of clean hydrogen in decarbonising various sectors and highlights the need for infrastructure that can facilitate the production, storage, and transportation of hydrogen.

National Policy Statement for Electricity Networks Infrastructure (NPS EN-5)³⁴

- 4.2.8 NPS EN-5 addresses policy for electricity networks infrastructure, including the routing of overhead lines and below ground transmission/ distribution lines and associated infrastructure. EN-5 recognises that all power lines within the scope of the policy *“including network reinforcement and upgrade works, and associated infrastructure such as substations, are considered to be critical national priority (CNP) infrastructure”* as they will *“contribute towards greater efficiency in constructing, operating and connecting low carbon infrastructure to the National Electricity Transmission System.”*

National Planning Policy Framework

- 4.2.9 The NPPF²⁷, introduced in March 2012 (last updated December 2024), sets out the Government’s planning policies for England. It is a material consideration in planning decisions. The NPPF is supported by the Planning

³³ Department for Energy Security and 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 24/01/2025].

³⁴ Department for Energy Security and Net Zero (2024) National Policy Statement for electricity networks infrastructure (EN-5). Available at: <https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf> [Accessed 28/01/25].

Practice Guidance (PPG)³⁵, which provides more detailed guidance on various aspects of planning.

- 4.2.10 Paragraph 5 of the NPPF sets out that it does not contain specific policies for NSIPs and states that *“these [NSIP] are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework).”*
- 4.2.11 Since the NPPF has the potential to be considered important and relevant to the SoS consideration of the Proposed Development, a summary of relevant policies within the NPPF is provided below.
- 4.2.12 Section 2 ‘Achieving sustainable development’ confirms (paragraph 7) that the purpose of the planning system is to contribute to the achievement of sustainable development, summarised as *“meeting the needs of the present without compromising the ability of future generations to meet their own needs.”* Paragraph 8 goes on to identify three overarching objectives to the achievement of sustainable development, which are interdependent and need to be pursued in mutually supportive ways. These are:
- *“an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*
 - *a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural wellbeing; and*
 - *an environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”*
- 4.2.13 Paragraph 10 of the NPPF highlights that at the heart of the Framework is a presumption in favour of sustainable development. For decision taking, this means approving development proposals that accord with an up-to-date development plan without delay. The NPPF is supportive of infrastructure projects. One of the methods of fulfilling the objective of sustainable

³⁵ Ministry of Housing, Communities & Local Government (2024) Planning Practice Guidance. Available at: <https://www.gov.uk/government/collections/planning-practice-guidance> [Accessed 24/01/2025].

development listed at paragraph 8 under ‘a) an economic objective’ is through the “*provision of infrastructure.*”

- 4.2.14 Paragraph 161 in Section 14 ‘Meeting the challenge of climate change, flooding and coastal change’ states: “*The planning system should support the transition to net zero by 2050 and take full account of all climate impacts including overheating, water scarcity, storm and flood risks and coastal change ... it should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the re-use of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.*”
- 4.2.15 Paragraph 168(a) states that when determining applications for all forms of renewable and low carbon energy developments and their associated infrastructure, there should be no requirement for applicants to demonstrate the overall need for renewable or low carbon energy.
- 4.2.16 Annex 1 of the NPPF, specifically paragraphs 231 of the NPPF, states the policies within the Framework are material considerations which should be considered in dealing with applications from the day of its publication.
- 4.2.17 While paragraph 232 states that due weight should be given to relevant policies in existing plans according to their degree of consistency with the NPPF, the closer the policies in the plan align with the NPPF, the greater the weight that may be given to them.
- 4.2.18 The above NPPF policies will be considered further within the Planning Statement that accompanies the Application

4.3 Marine Policy Statements & Plans

- 4.3.1 Several elements of the Proposed Development involve works within the UK Marine Area, under the tidal River Tees. The relevant marine policy documents are the UK MPS and the North East Inshore and North East Offshore Marine Plan ²⁹.

UK Marine Policy Statement (March 2011)

- 4.3.2 The UK MPS, adopted in March 2011, provides the policy framework for preparing marine plans and taking decisions affecting the marine environment. It has been prepared and adopted for the purposes of Section 44 of the MCAA 2009 and is intended to apply in parallel with terrestrial consenting regimes, including the 2008 Act regime. The MPS was updated in September 2020 to clarify how references to EU law should be interpreted from 1 January 2021 following the UK’s withdrawal from the EU.
- 4.3.3 Chapter 3 sets out the policy objectives for key activities that take place in

the marine environment. Section 3.3 deals specifically with 'Energy production and infrastructure development'. Paragraph 3.3.1 notes that a secure, sustainable and affordable supply of energy is of central importance to the economic and social wellbeing of the UK. Paragraph 3.3.4 sets out issues that decision maker should consider when examining and determining applications for energy infrastructure.

North East Inshore and North East Offshore Marine Plan (June 2021)

- 4.3.4 Marine plans are intended to set out detailed policy and spatial guidance for a particular area. The UK is divided into several marine planning regions with associated plan authorities that are responsible for preparing marine plans. In England, the MMO is the plan authority. Marine plans are a material consideration.
- 4.3.5 The Proposed Development lies within the 'North East Inshore Marine Area', which stretches from Flamborough Head in Yorkshire to the Scottish Border. The Plan Area has three main tidal rivers, including the River Tees.
- 4.3.6 The North East Marine Plan is intended to provide a strategic approach to decision making, considering future use and providing a clear approach to managing resources, activities and interactions within the area.
- 4.3.7 Policy NE-CCUS-3 is of relevance to the Proposed Development as it supports proposals associated with the deployment of low carbon infrastructure for industrial clusters such as that being proposed on Teesside as part of the ECC being advanced by the NEP. The policy states: *"The government identified potential regional clusters which can be utilised for low carbon development in the Delivering clean growth: CCUS Cost Challenge Taskforce report and the subsequent plan, The UK carbon capture, usage and storage (CCUS) deployment pathway: an action plan. NE-CCUS-3 supports the development of low carbon industrial clusters where low carbon infrastructure, including carbon capture, usage and storage technologies could be deployed. Encouraging developments associated with industrial clusters aims to reduce the capital costs of deploying carbon capture, usage and storage, maximising the economies of scale."*
- 4.3.8 The above policies and development principles will be considered within the Planning Statement that accompanies the Application

Local Policy

- 4.3.9 The Proposed Development is based in the local authority areas of SBC and RCBC. The key planning allocations/ designation and related development plan policies (based upon the relevant policies maps) that apply to the

Proposed Development within the administrative areas of SBC and RCBC are listed below. In addition, other documents including supplementary planning documents (SPD), and supplementary planning guidance (SPG) add further detail to these policies.

Stockton-on-Tees Borough Council Local Plan (adopted January 2019)

4.3.10 Key planning allocations/ designations and related development plan policies for the SBC administrative area are:

- Policy SD1 - Presumption in favour of Sustainable Development;
- Policy SD4 - Economic Growth Strategy;
- Policy SD5 - Natural, Built and Historic Environment;
- Policy SD8: Sustainable Design Principles;
- Policy EG4 - Seal Sands, North Tees and Billingham;
- Policy TI1 – Transport Infrastructure;
- Policy ENV2 - Renewable and Low Carbon Energy Generation;
- Policy ENV4 – Reducing and Mitigating Flood Risk;
- Policy ENV5 - Preserve, Protect and Enhance Ecological Networks, Biodiversity and Geodiversity;
- Policy ENV6 - Green Infrastructure, Open Space, Green Wedges and Agricultural Land;
- Policy ENV7 – Ground, Air, Water, Noise and Light Pollution;
- Policy HE1 – Conservation and Enjoyment of the Historic Environment; and
- Policy HE2 – Conserving and Enhancing Stockton's Heritage Assets.

Redcar & Cleveland Local Plan (adopted May 2018)

4.3.11 The key planning allocations/ designations and related development plan policies that apply to the Proposed Development within the RCBC area are:

- SD3 - Development Limits;
- SD4 - General Development Principles;
- SD6 - Renewable and Low Carbon Energy;
- SD7 - Flood and Water Management;
- N1 – Landscape;
- N2 - Green Infrastructure;

- N4 - Biodiversity and Geological Conservation;
- Policy HE1 – Conservation Areas;
- Policy HE2 – Heritage Assets;
- Policy HE3 – Archaeological Sites and Monuments;
- ED6 - Promoting Economic Growth; and
- LS4 - South Tees Spatial Strategy.

5 Environmental Impact Assessment Process

5.1 EIA Guidance

5.1.1 The EIA will be carried out in accordance with the requirements of the EIA Regulations. In addition, the approach to the EIA will have regard to the guidance and advice provided within the following:

- Overarching NPS for Energy (NPS EN-1)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)³³;
- The NPS for Electricity Networks Infrastructure (NPS EN-5)³⁴;
- The NPPF²⁷;
- Planning Act 2008: Pre-Application Stage for Nationally Significant Infrastructure Projects³⁶;
- Nationally Significant Infrastructure Projects: Advice on EIA Notification and Consultation³⁷;
- Nationally Significant Infrastructure Projects: Advice on the Preparation and Submission of Application Documents³⁸;
- Planning Inspectorate (PINS) Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements⁶;
- PINS Advice Note Nine: Rochdale Envelope¹⁶;
- Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment³⁹;

³⁶ UK Government (2024) Planning Act 2008: Guidance on the pre-application stage for NSIP. Available at: <https://www.gov.uk/guidance/planning-act-2008-pre-application-stage-for-nationally-significant-infrastructure-projects> [Accessed 24/01/2025].

³⁷ UK Government (2024) Nationally Significant Infrastructure Projects: Advice on EIA Notification and Consultation. Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-eia-notification-and-consultation> [Accessed 24/01/2025].

³⁸ Planning Inspectorate (2024) Nationally Significant Infrastructure Projects - Advice on the Preparation and Submission of Application Documents. Available: <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-six-preparation-and-submission-of-application-documents> [Accessed 24/01/2025].

³⁹ Planning Inspectorate (2024) Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment. Available: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-cumulative-effects-assessment> [Accessed 24/01/2025].

- Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive⁴⁰;
- Nationally Significant Infrastructure Projects: Commitments Register⁴¹; and
- topic specific guidance as set out in the relevant chapters of this EIA Scoping Report.

Overview of approach to Assessment

Competent Experts

- 5.1.2 In accordance with the EIA Regulations, as amended, a Statement of Competence will be included within the ES, outlining the relevant expertise and qualifications of the EIA professionals including their professional accreditations and experience.
- 5.1.3 The EIA will be led by Arup. Arup is a member of the Institute of Environmental Management and Assessment (IEMA) EIA Quality Mark. The EIA Quality Mark is a scheme operated by IEMA that allows organisations that lead the co-ordination of statutory EIA in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed. The EIA Quality Mark is a voluntary scheme.

General Approach to EIA

- 5.1.4 The EIA process, as outlined in Regulation 5 of the EIA Regulations and PINS Advice Note Seven, is used to identify the LSEs on the environment that could occur as a result of a proposed development. The information gathered through EIA is taken into account by the decision-making body (the SoS) when determining an application for consent.
- 5.1.5 The EIA and overall design process will be iterative and will follow the various individual stages outlined below:
1. scoping and consultation with statutory consultees;
 2. baseline data gathering including the review of secondary information, previous environmental studies and publicly available information and databases;
 3. physical surveys and monitoring;

⁴⁰ Planning Inspectorate (2024) Nationally Significant Infrastructure Projects - Advice on the Water Framework Directive. Available: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-the-water-framework-directive> [Accessed 24/01/2025].

⁴¹ UK Government (2024) Nationally Significant Infrastructure Projects: Commitments Register. Available: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-commitments-register#:~:text=achieved%20in%20practice,-Purpose%20and%20use%20of%20a%20Commitments%20Register,%2C%20construction%2C%20operation%20and%20decommissioning> [Accessed 24/01/2025].

4. consideration of relevant local, regional, and national planning policies, guidelines, and legislation relevant to EIA;
5. preliminary impact assessment and the consideration of technical standards for the development of significance criteria;
6. identification of mitigation measures;
7. assessment of likely significant residual effects; and
8. preparation of the Preliminary Environmental Information Report (PEIR) and ES.

5.1.6 Interface between the EIA and design teams will continue throughout the design process with environmental aspects informing and contributing to design evolution. This will ultimately support the avoidance and reduction of potential adverse effects of the Proposed Development on the environment.

5.1.7 Within the assessment, a description will be given of any topic-specific methodology employed, including significance criteria to be applied based on guidance and legislation specific to that topic. The topic-specific sections within this EIA Scoping Report provide an overview of the proposed assessment methodology.

5.1.8 The EIA process will be undertaken in accordance with the requirements of the EIA Regulations and the advice provided in relevant guidance including PINS Advice Note Seven. The ES will provide the following relevant information as outlined in regulation 14(2)(a)-(f) and Schedule 4 of the EIA Regulations.

Impacts and Effect Prediction

5.1.9 Some environmental topic assessments will use calculations and modelling to determine the predicted impacts of the Proposed Development on receptors in order to assess the likely significance of effects. Others will be based on the expert judgement of the assessment team and initial assessments, taking into account relevant technical advice and guidance.

5.1.10 Each environmental topic assessment will present a clear justification for the strategy adopted and state all relevant assumptions to facilitate independent review.

Assessment of Likely Significant Effects

5.1.11 The EIA will identify the likely significance of environmental effects (beneficial or adverse) arising from three phases (construction, operation (including maintenance) and decommissioning) of the Proposed Development, in addition to cumulative and combined effects as set out in Section 5.2. The likely significance of effects will be determined by reference to the criteria set out for each environmental topic. Residual effects are the effects that remain following the implementation of proposed mitigation

measures.

- 5.1.12 The likely effects that the Proposed Development may have on identified environmental receptors will be influenced by a combination of the sensitivity or value of the receptor and the predicted magnitude of impact from the baseline conditions. Assignment of environmental sensitivity of a receptor will generally depend on the vulnerability, recoverability and value of the receptor. The environmental sensitivity (or importance) will be determined using the categories set out in Table 5.1, or as stipulated in individual topic chapters.

Table 5.1: Indicative environmental sensitivity of a receptor

Sensitivity	Criteria
High	High importance and rarity, international level and very limited potential for substitution
Medium	High or medium importance and rarity, regional level and limited potential for substitution
Low	Low or medium importance and rarity and local level
Negligible	Very low importance or rarity and local level
Negligible	Very low importance or rarity and local level

- 5.1.13 Where other categories of sensitivity have been used, this will be set out in the individual environmental topic assessment.
- 5.1.14 The categorisation of the magnitude of impacts will take into account the following factors, or as stipulated in individual topic chapters:
- scale of alteration/ change;
 - geographical extent;
 - duration and reversibility (for example: temporary, short term and reversible; or temporary long term and reversible; or permanent and irreversible); and
 - frequency.
- 5.1.15 The magnitude of impact will be assigned using the categories outlined in Table 5.2, or as stipulated in individual topic chapters.

Table 5.2: Indicative magnitude of impact

Magnitude	Criteria
High	Total loss or major alteration to key elements/ features of the baseline (i.e. pre-development) conditions
Medium	Partial loss or alteration to one of more key elements/ features of the baseline (i.e. pre-development) conditions
Low	Minor shift away from baseline (i.e. pre-development) conditions
Negligible	Very slight change from the baseline (i.e. pre-development) conditions

5.1.16 Further details of the topic-specific methodologies adopted for the EIA will be defined within the methodology section of each of the topic chapters.

5.1.17 In order to provide a consistent approach to expressing the outcomes of the various technical assessments undertaken as part of the ES, and thereby enable comparison between LSEs upon different environmental components, the following terminology will be used:

- Adverse - detrimental or negative effect to an environmental resource or receptor; or
- beneficial – advantageous or positive effect to an environmental resource or receptor;

And

- negligible – imperceptible effect to an environmental resource or receptor; or
- minor – slight, very short or highly localised effect of no significant consequence; or
- moderate – more than a slight, very short or localised effect (by extent, duration or magnitude) which may be considered significant; or
- major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability.

5.1.18 The level of an environmental effect will be assigned by the interaction of both sensitivity of the receptor and magnitude of impact. Classification of likely significant environmental effects will generally follow the matrix outlined in Table 5.3 but will be confirmed in each technical assessment which will consider relevant topic-specific legislation, planning policy and guidance.

Table 5.3: Classification of environmental effects matrix

Sensitivity of resource	Magnitude of Impact				
		High	Medium	Low	Negligible
	High	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible

5.1.19 Each of the technical chapters will clearly identify the criteria, including sources and justifications, for quantifying the impact magnitude. Where possible, this will be based upon quantitative and accepted criteria, together with the use of value judgements and expert interpretations to establish to what extent an impact is environmentally significant.

5.1.20 In general, any likely effect (be it adverse or beneficial) assessed as ‘major’ or ‘moderate’ would be considered to be ‘significant.’ This is a widely used methodology based on current best practice.

Mitigation measures and monitoring

5.1.21 Where adverse effects can be reduced to acceptable levels through incorporation of appropriate design or management measures, these will be identified within the commitments register of the ES along with an explanation as to how such measures will be secured. A draft Commitments Register is included in Appendix B (Volume II) of this EIA Scoping Report.

5.1.22 Where appropriate, monitoring procedures will be identified to address any likely residual significant adverse effects in order to measure the effectiveness of the mitigation proposed. A range of supporting management plans will be produced to secure mitigation and will accompany the Application.

Structure of the ES

5.1.23 Regulation 14(2) and Schedule 4 of the EIA Regulations specify the information to be included in an ES. The proposed structure of the ES is intended to provide all of the required information in a clear and informative manner in order to facilitate a full understanding of the assessment undertaken and any significant effects reported. This will be clearly cross-referenced in the ES to demonstrate that all information requirements specified in the EIA Regulations have been met.

5.1.24 The overall ES is likely to comprise of the following volumes and documents:

Non-Technical Summary (NTS): this document will provide a summary of the key issues and findings of the EIA in non-technical language;

Volume I: ES Main Volume: this will contain the relevant chapters of the ES, for the disciplines and matters scoped in;

Volume II: Technical Appendices: reports providing supplementary information that underpins the assessments presented in Volume I. For example, relevant technical assessments, baseline information reports, methodologies, modelling and photographs; and

Volume III: Figures: stand-alone figures volume containing all figures not included separately within the technical appendices.

5.1.25 Subject to agreement with PINS regarding the proposed scope of the ES, the chapters to be included within ES Volume I are set out in Section 8 of this EIA Scoping Report.

5.1.26 Topic chapters scoped in will be broadly structured to include:

1. Introduction: provides a broad overview and scope of topic assessment;
2. Legislation, planning policy context and guidance: this section of the technical chapters will provide an overview of the relevant legislation, planning policy and technical guidance relevant to the assessment and how they have been applied;
3. Assessment Methodology: describing the relevant guidance and legislation followed to inform the methodology applied, including assessment of significance. The significance of effects will be evaluated with reference to definitive standards, accepted criteria, and legislation where available. Where it is not possible to quantify impacts, qualitative assessments will be conducted, based on available knowledge and professional judgment. Assumptions will be stated, and where uncertainty exists, this will be noted in the relevant technical assessment chapter. This section will also describe consultation, covering scoping and ongoing technical engagement and statutory consultation;
4. Baseline conditions: a description of the baseline environmental aspects on which the assessment is based, referring to desk-top based sources and data gathered;
5. Design Development and Impact Avoidance: measures that have been integrated into the Proposed Development in order to avoid or reduce adverse environmental effects will be described. Such measures may include refinement of the design and layout of the Proposed Development to avoid impacts on sensitive receptors, implementation of a CEMP, and adherence of relevant legislation, guidance and best practice. The assessment of impacts and effects in later sections will take account of these measures already being in place;
6. Likely Impacts and Effects: the results of the assessment and LSEs anticipated during the construction, operational and decommissioning phases of the Proposed Development;

7. Mitigation, Monitoring and Enhancement Measures: a description of proposed additional measures, following the mitigation hierarchy, to avoid, reduce, if possible, remedy and (where relevant) offset likely significant adverse effects. These are over and above any measures embedded i.e. 'designed in' to the Proposed Development;
8. Summary of likely significant residual effects: the results of re-assessments which take into account the additional mitigation measures, where appropriate including an assessment summary table, presenting the impacts, additional mitigation, and likely significant residual effects for each topic; and
9. Limitations and assumptions: any limitations to the assessment and assumptions made, including justification for why the assumptions are reasonable.

5.1.27 The assessments completed within each of the topic chapters will feed into a Cumulative and Combined Effects chapter of the ES as described in Table 8.2.

Commitments Register

5.1.28 From EIA scoping and drafting of application documents at the pre-application stage through to the end of examination of the Application, commitments to a number of measures are required to assist in good design objectives being secured and implemented. This is to ensure that potential significant environmental effects arising from the Proposed Development are mitigated as far as possible and in accordance with the mitigation hierarchy. PINS has published guidance on NSIP which recommends that these commitments be recorded on a Commitments Register ⁴¹.

5.1.29 PINS recommends that versions of the register are agreed with relevant stakeholders and submitted to PINS at the following milestones of the planning process:

- EIA Scoping – the first iteration is submitted with a scoping request setting out where applicants rely on commitments as the basis for scoping matters out or refining the scope of assessment;
- PEIR;
- draft document review;
- submission of DCO application; and
- any updates as required by an Examining Authority within an examination.

5.1.30 PINS recommends the Commitments Register should be a 'live' document that is updated throughout the NSIP planning process to ensure that all commitments are up to date at the time the NSIP application is decided by the SoS. If the DCO is granted, the Commitments Register will then be

further updated to incorporate any additional or modified commitments imposed as part of the decision.

- 5.1.31 A draft version of the Commitments Register is included in Appendix B: Commitments Register (Volume II).

5.2 Cumulative and Combined Effects

- 5.2.1 Due to the potential for cumulative effects to occur as a result of the construction and operation (including maintenance) of the Proposed Development, a cumulative assessment will be undertaken as part of the EIA in accordance with the EIA Regulations¹. This section sets out the proposed scope and methodology for the assessment of cumulative and combined effects as a result of the Proposed Development. All topics in Section 6 that are Scoped In for further assessment in the ES will feed into the Cumulative and Combined Effects assessment.
- 5.2.2 This section is supported by Appendix C: Initial Long List for Cumulative Effects Assessment (Volume II) and Figure 5.2: Cumulative Assessment Long List (Appendix A – Volume II) which illustrates the Proposed Development Site location in relation to an initial list of other proposed schemes that may be of relevance to the cumulative assessment.
- 5.2.3 The following types of cumulative effects will be considered within the ES:
- Cumulative effects (or inter-project effects) are environmental impacts from several developments, which when considered together, could result in an effect of greater significance (positive or negative) on a resource or receptor than when considered alone.
 - Combined effects (or intra-project effects) are different environmental effects resulting from a single development such as the Proposed Development (e.g. noise, air quality, visual effects, etc.) on any one receptor/ resource that may, in combination, cause an effect of greater significance compared to a single environmental effect on that receptor/ resource).
- 5.2.4 The assessment of cumulative effects will follow the four-stage approach outlined in Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment³⁹ and be undertaken to address the requirements of the EIA Regulations and the assessment requirements of the Overarching NPS for Energy (EN-1)²⁶. Stages 1 and 2 have been completed as part of this EIA Scoping Report; these and other developments identified in later stages will be reviewed and updated as part of the assessment presented in the ES.
- Stage 1: establishing the long list of 'other existing development and/ or approved development';

- Stage 2: establishing a shortlist of ‘other existing development and/ or approved development’;
- Stage 3: information gathering; and
- Stage 4: assessment.

Stage 1: Establishing the long list of ‘other existing development and/or approved development’.

5.2.5 The zone of influence (Zoi) of the Proposed Development, within which any potential effects of the Proposed Development may combine with the effects arising from other proposed schemes, has been determined on the basis of the maximum study areas of the technical assessments considered within this EIA Scoping Report and is presented in Table 5.4. Separate Zoi have been identified for the HPF Area (the land required for the construction and operation of the HPF adjacent to the existing CATS Terminal), and the Proposed Development Site (including the HPF, Hydrogen Pipeline(s) and other components described in Section 3) as the operational effects of the HPF (and therefore potential for cumulative effects) are likely to be different to those of the operational Hydrogen Pipeline(s) and other project components.

Table 5.4: Indicative Zones of Influence (EIA Scoping Stage)

Environmental Topic	Zone of Influence (HPF Area)	Zone of Influence (Proposed Development Site)
Air Quality	<i>Construction</i> Institute for Air Quality Management (IAQM) Guidance (IAQM 2024)⁶¹ will be followed – initial study area of up to 2 km for scoping for potential impacts to human health and amenity and including affected road network for potential impacts on sensitive receptors from changes in pollutant concentrations. <i>Operation</i> Up to 15 km from the HPF Area Zoi for ecological receptors (SPA, SAC, Ramsar sites (protected wetlands) and SSSI). Up to 2 km for non-statutory designated ecological receptors (ancient woodlands, LWS and NNR and LNR).	<i>Construction</i> IAQM Guidance will be followed – initial study area of up to 2 km for scoping for potential impacts to human health and amenity and including affected road network for potential impacts on sensitive receptors from changes in pollutant concentrations. <i>Operation</i> N/A
Biodiversity	<i>Construction and Operation</i> Up to 15 km Zoi for ecological receptors from the HPF Area	<i>Construction and Operation</i> Up to 15 km Zoi for ecological receptors from the Proposed

Environmental Topic	Zone of Influence (HPF Area)	Zone of Influence (Proposed Development Site)
	(where construction effects will arise) for ecological receptors (SPA, SAC, Ramsar sites and SSSI). Up to 2 km for non-statutory designated ecological receptors (ancient woodlands, LWS and NNR and LNR).	Development Site (where construction effects will arise) for ecological receptors (SPA, SAC, Ramsar sites and SSSI). Up to 2 km for non-statutory designated ecological receptors (ancient woodlands, LWS and NNR and LNR).
Climate Change and Resilience	<i>Construction</i> N/A <i>Operation</i> Zol includes all land identified as potentially needed to operate the HPF.	<i>Construction</i> N/A <i>Operation</i> Zol includes all land identified as potentially needed to operate the Proposed Development Site and the surrounding areas that may impact the Proposed Development Site (e.g. River Tees).
Cultural Heritage	<i>Construction</i> N/A <i>Operation</i> N/A	<i>Construction</i> Zol includes all land up to 200 m from the Proposed Development Site for potential impacts on cultural heritage assets. <i>Operation</i> Zol includes all land up to 200 m from the Proposed Development Site for potential impacts on cultural heritage assets (setting effects).
Greenhouse Gases	<i>Construction/ Operation</i> In line with IEMA guidance ⁴² (IEMA, 2022) a cumulative assessment of a specified list of developments is not considered appropriate or meaningful ⁴³ in terms of assessing the Proposed Developments impact on the receptor of the global climate.	<i>Construction/ Operation</i> In line with IEMA guidance (IEMA, 2022) a cumulative assessment of a specified list of developments is not considered appropriate or meaningful in terms of assessing the Proposed Developments impact on the receptor of the global climate.
Ground Conditions	<i>Construction</i> Up to 250 m Zol to include any potential areas of contamination with potential to migrate and affect sensitive receptors. For agricultural soils, the HPF Area defines the Zol. <i>Operation</i>	<i>Construction</i> Up to 250 m to include any potential areas of contamination with potential to migrate and affect sensitive receptors. For agricultural soils, the Proposed Development Site boundary defines the Zol.

⁴² Institute of Environmental Management and Assessment (IEMA) (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2nd Edition.

⁴³ IEMA Guidance states "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."

Environmental Topic	Zone of Influence (HPF Area)	Zone of Influence (Proposed Development Site)
	N/A	<i>Operation</i> N/A
Landscape and Visual Impact Assessment	<i>Construction</i> 2 km Zol from the HPF Area. <i>Operation</i> N/A	<i>Construction</i> 2 km Zol from the Proposed Development Site. <i>Operation</i> 2 km Zol from the Proposed Development Site.
Marine Biodiversity	<i>Construction and Operation</i> 2 km from the HPF Area and Wastewater Connection Corridor for designated and non-designated habitats (SPA, SAC, Ramsar, SSSI, NNR, Marine Conservation Zones (MCZ), Highly Protected Marine Areas (HPMA) and LNR), and priority habitats.	<i>Construction</i> 2 km from the existing River Tees crossing options within the Proposed Development Site Zol for designated and non-designated habitats (SPA, SAC, Ramsar, SSSI, NNR, MCZ, (HPMA and LNR), and priority habitats. <i>Operation</i> N/A
Material Assets and Waste	<i>Construction</i> Zol consists of the geographical area of the north-east of England to include the availability of construction materials and capacity of waste management infrastructure for construction waste. For hazardous waste, the Zol considers relevant landfill capacity within England. <i>Operation</i> Zol consists of the geographical area of the north-east of England to include the availability of operational materials and capacity of waste management infrastructure for operational waste. For hazardous waste, the Zol considers relevant landfill/ hazardous waste treatment capacity within England.	<i>Construction</i> Zol consists of the geographical area of the north-east of England to include the availability of construction materials and capacity of waste management infrastructure for construction waste. For hazardous waste, the Zol considers relevant landfill capacity within England. <i>Operation</i> N/A
Major Accidents and Disasters	<i>Construction and Operation</i> Up to 5 km Zol from the HPF Area.	<i>Construction and Operation</i> Up to 5 km Zol from the Hydrogen Pipeline (east) and (west) terminal points.
Noise and Vibration	<i>Construction</i>	<i>Construction</i>

Environmental Topic	Zone of Influence (HPF Area)	Zone of Influence (Proposed Development Site)
	Up to 300 m from the HPF Area for construction noise affecting sensitive human and ecological receptors and 100 m vibration study area. Up to 50 m from the centreline of roads affected by an increase in traffic as a result of construction vehicles on the road network affecting sensitive human and ecological receptors. <i>Operation</i> Up to 1 km Zol around the HPF Area for operational noise effects on sensitive human and ecological receptors.	Up to 300 m around the Proposed Development Site for construction noise affecting sensitive human and ecological receptors and 100 m vibration study area. <i>Operation</i> N/A
Socio-economics	<i>Construction and Operation</i> Zol is defined by the HPF together with the surrounding Lower Super Output Areas (LSOA) (E01012198: Stockton-on-Tees 003B, E01012216: Stockton-on-Tees 003E, E01012107: Redcar and Cleveland 003D, E01032560: Redcar and Cleveland 003E and E01032561: Redcar and Cleveland 003F).	<i>Construction and Operation</i> Zol is defined by the Proposed Development Site boundary together with the surrounding LSOA (E01012198: Stockton-on-Tees 003B, E01012216: Stockton-on-Tees 003E, E01012107: Redcar and Cleveland 003D, E01032560: Redcar and Cleveland 003E and E01032561: Redcar and Cleveland 003F).
Traffic and Transportation	<i>Construction</i> Zol includes local roads, public transport links, PRow and pedestrian and cycle routes likely to be affected by an increase in traffic as a result of the construction of the HPF. <i>Operation</i> N/A as operational road traffic proposed to be scoped out.	<i>Construction</i> Zol includes local roads, public transport links, PRow and pedestrian and cycle routes likely to be affected by an increase in traffic as a result of the construction of the Proposed Development Site. <i>Operation</i> N/A
Water Environment	<i>Construction and Operation</i> Up to 1 km around the HPF Area to include all relevant surrounding surface water features, including main rivers and their tributaries, ordinary watercourses, surface water abstractions and flood zones. Up to 3 km around the HPF Area for private water supplies (PWS). 1 km around the HPF Area to include groundwater features	<i>Construction and Operation</i> Up to 1 km around the Proposed Development Site boundary to include all relevant surrounding surface water features, including main rivers and their tributaries, ordinary watercourses, surface water abstractions and flood zones. Up to 3 km around the Proposed Development Site Zol for PWS. 1 km around the Proposed Development Site to include

Environmental Topic	Zone of Influence (HPF Area)	Zone of Influence (Proposed Development Site)
	including underlying aquifers, SPZ, springs, groundwater abstracts and potential groundwater dependent terrestrial ecosystems (GWDTE).	groundwater features including underlying aquifers, SPZ, springs, groundwater abstracts and potential GWDTE.

5.2.6 The following data sources have been used to identify proposed schemes which may be committed developments:

- National Infrastructure Planning website⁴⁴.
- RCBC online planning portal⁴⁵.
- SBC online planning portal⁴⁶.
- Hartlepool Borough Council (HBC) online planning portal⁴⁷.
- Middlesbrough Council online planning portal⁴⁸.
- MMO Marine Case Management System⁴⁹.

5.2.7 An initial long list of committed developments for consideration within the ES was generated and filtered to screen out proposed schemes of insufficient scale or of a type that would not result in cumulative effects within the Proposed Development. Examples of projects omitted from the initial dataset filter included planning applications older than five years or ML that would have expired prior to construction of the Proposed Development.

5.2.8 A combination of professional judgement and PINS guidance has been used to identify the scope of the cumulative effects assessment. The study area for the consideration of cumulative and combined effects has been developed taking into account the predicted ZOI for each technical discipline/ extent of impacts associated with the Proposed Development, using the approach set out in paragraph 5.2.15. To provide the final initial long list in Appendix C (Volume II), the following projects have been considered for all topics and affected receptors:

⁴⁴ The Planning Inspectorate, National Infrastructure Planning. Available at: <https://infrastructure.planninginspectorate.gov.uk/> [Accessed 24/01/2025].

⁴⁵ Redcar and Cleveland Borough Council, Planning Register. Available at: <https://www.redcar-cleveland.gov.uk/planning/view-comment-or-object/search-for-and-view-planning-application> [Accessed 24/01/2025].

⁴⁶ Stockton-on-Tees Borough Council, Planning Applications. Available at: <https://www.stockton.gov.uk/planning-applications> [Accessed 24/01/2025].

⁴⁷ Hartlepool Borough Council, Planning Application Search. Available at: <https://planning.hartlepool.gov.uk/portal/servlets/ApplicationSearchServlet> [Accessed 24/01/2025].

⁴⁸ Middlesbrough Council, Planning Applications. Available at: <https://www.middlesbrough.gov.uk/planning-and-development/planning-applications/> [Accessed 24/01/2025].

⁴⁹ Marine Management Organisation, Marine Case Management System. Available at: https://marinelicensing.marinemanagement.org.uk/mmofox5/fox/live/MMO_LOGIN/login [Accessed 24/01/2025].

- NSIP within 15 km of the Proposed Development Site;
- applications for EIA development within 2 km of the Proposed Development Site (or subject to Scoping/ Screening under the EIA Regulations);
- other major applications that are not EIA development within 1 km of the Proposed Development Site;
- ML (or applications on MMO online portal) considered of potential relevance/ requiring further screening; and
- other proposed schemes that do not meet the above criteria but which the Applicant deems appropriate for inclusion.

5.2.9 Each proposed scheme on the initial long list has been reviewed to determine its status at the time of undertaking the assessment and has been assigned a status and tier, informed by the guidance on levels of certainty for each Tier presented within the UK Government Advice³⁹.

Table 5.5: Cumulative development search criteria and distances

Tier	Degree of Certainty Other existing and, or approved development	Decreasing level of detail likely to be available.
Tier 1	under construction permitted applications under the 2008 Act or other regimes but not yet implemented submitted applications under the 2008 Act or other regimes but not yet determined all refusals subject to appeal procedures not yet determined	
Tier 2	projects on the PINS programme of projects	
Tier 3	projects on the PINS 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	

5.2.10 UK Government advice³⁹ is that: “where other existing and, or approved developments are expected to be completed before construction of the proposed NSIP and the effects are fully determined, effects arising from them should be considered as part of the baseline and may be considered as part of both the construction and operational assessment.” It is further advised that: “If the effects of other existing and, or approved development

under construction are not yet fully determined, for example the outcome of mitigation is being monitored and is not yet known, it may be appropriate to consider these in the cumulative effects assessment (CEA). The approach should be agreed with the relevant consultation bodies. The ES should distinguish between projects forming part of the dynamic baseline and those in the CEA.”

- 5.2.11 On this basis, developments that are already in existence, i.e. those which are completed and operational, are considered to form part of the environmental baseline conditions within which the Proposed Development will be constructed and operated. These will therefore be accounted for through establishment of the current or future baseline within each technical chapter of the ES and will not be considered for short listing.
- 5.2.12 Similarly, where proposed schemes are expected to be constructed and become operational prior to construction of the Proposed Development (described in Section 3.3), and where the effects of those projects are fully determined, these will also generally be considered within the future environmental baseline in the ES. However, in certain cases, to assess a worst-case scenario, professional judgement will be applied considering the potential for delay to construction (or where relevant marine licensing) works and potential for construction (or licensable marine) activities to coincide with those of the Proposed Development.

Stage 2: Establishing a shortlist of ‘other existing development and/ or approved development’

- 5.2.13 For Stage 2, it is necessary to begin to gather information from available sources and to consider whether the effects of the Proposed Development should be considered in conjunction with the potential effects from other schemes or activities that are both reasonably foreseeable, in terms of delivery (e.g. the applicable scheme has planning consent or is in the planning process) and geographically located in a position where environmental impacts could act together to create an effect that is more (or less) significant overall than the effect of the individual developments alone.
- 5.2.14 Professional judgement has been used to create an initial long list for scoping – the purpose of this is to enable further technical engagement with consultees following receipt of the EIA Scoping Opinion, acknowledging the importance of local knowledge in determining the likelihood for significant cumulative effects. The initial long list will continue to evolve and be updated, and a final long list will be submitted with the Application.
- 5.2.15 For the purposes of the initial short-list for scoping, all NSIP within the largest 15 km ZoI (Biodiversity operational effects) of the Proposed Development have been included as it is considered that effects associated

with large scale schemes (such as an NSIP) may be of greater impact magnitude/ duration at a larger number of receptors/ environmental resources than smaller schemes (although these may still contribute to effects). The initial short-list for scoping only includes those committed developments in other consenting regimes described in paragraph 5.2.8 that are considered likely, based on professional judgement, to have the potential to result in significant cumulative effects with the Proposed Development.

- 5.2.16 Figure 5.2 in Appendix A (Volume II) shows the location of the initial short-list for scoping. The Applicant is seeking feedback from PINS and other consultees including RCBC and SBC on other committed developments that should be included in the updated short-list which will be published in the PEIR at statutory consultation stage.
- 5.2.17 The updated short-list that accompanies the PEIR will consider, on a discipline-by-discipline basis, the ZoI published in available application documents for both construction and operational effects. Taking into consideration feedback from consultees, this will inform an updated screening exercise to understand if these (or other committed developments) should be carried through to Stage 3 and Stage 4 cumulative effects assessment, considering the geographical and temporal scope of the 'other development' in order to determine whether the developments have the ability to interact with the Proposed Development.

Decommissioning

- 5.2.18 As the Proposed Development, for each train, has an estimated design life of 25 years (which could be extended depending on market conditions and condition of the plant and equipment), cumulative effects during decommissioning are not proposed to be considered as it is not possible to predict the developments that would be in progress at the point in time when decommissioning occurs.

Combined Effects Assessment

- 5.2.19 Combined effects are those that may arise when several different impacts resulting from the Proposed Development have the potential to affect a single receptor (for example, ecological habitats and/ or protected species may be sensitive to and receive interacting effects during either construction or operation from noise, air quality, disturbance, water contamination and ground contamination etc.). Combined effects shall generally be assessed within individual topic chapters.

Assessment Criteria

- 5.2.20 When considering both cumulative and combined effects, the embedded and any additional mitigation measures set out in the ES chapter for each discipline will be considered i.e. only residual (after mitigation) effects of the Proposed Development will be considered.
- 5.2.21 Cumulative and combined effects will be assessed and classified as neutral, minor, moderate or major adverse or beneficial. Moderate or major cumulative effects will be considered to be significant, using the methodology described in Section 5.1. The need for additional mitigation/ management/ monitoring measures to reduce the overall significance of any likely cumulative effects will be considered and where necessary, such measures would be set out in management plans that accompany the draft DCO and secured via requirement.

Transboundary Effects

- 5.2.22 Transboundary effects are ones whereby there could be a significant effect either alone or cumulatively on the environment in any European Economic Area (EEA) state due to the distance of the site from potential EEA receptors. On the basis of the information provided within this EIA Scoping Report, it is not considered likely that any transboundary effects would occur as a result of the Proposed Development.

6 Potentially Significant Environmental Aspects

6.1 Air Quality

Overview

- 6.1.1 This section sets out the proposed scope and methodology for the assessment of effects of the Proposed Development on Air Quality. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.1.2 This section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report and Appendix D: Construction Dust Assessment Methodology (Volume II). No figures accompany this section.

Legislation, Policy and Guidance Context

- 6.1.3 The following legislation, policy and guidance will be considered in the ES:
- Air Quality Standards Regulations 2010⁵⁰, including amendments (2016)⁵¹;
 - The Environment Act (1995)²⁰;
 - The Environment Act (2021)²¹;
 - The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023⁵²;
 - Industrial Emissions Directive (IED) 2010⁵³;
 - Environmental Permitting Regulations 2016²³;
 - Overarching NPS for Energy (EN-1) (2024)²⁶;
 - NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
 - The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
 - The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;

⁵⁰ UK Government (2010) The Air Quality Standards Regulations 2010.

⁵¹ UK Government (2016) The Air Quality Standards (Amendment) Regulations 2016.

⁵² UK Government (2023) The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023.

⁵³ European Union (2010) Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

- The NPPF (2024)²⁷;
- The PPG (2024)³⁵;
- SBC Local Plan (Adopted 30 January 2019) Policy SD5 and Policy ENV7³⁰;
- RCBC Local Plan (Adopted May 2018) Policy SD 1 and Policy LS 4³¹;
- Tees Valley Combined Authority (TVCA) Strategic Transport Plan 2020-2030 (2020)⁵⁴;
- Air Quality Strategy for England (2023)⁵⁵;
- Clean Air Strategy (2019)⁵⁶;
- Environmental Improvement Plan: First Revision of the 25 Year Environment Plan (2023)⁵⁷;
- The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020⁵⁸;
- Local Air Quality Management (LAQM) Technical Guidance LAQM.PG (2022)⁵⁹;
- Environment Agency Guidance: Air emissions risk assessment for your environmental permit (2024)⁶⁰;
- IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024)⁶¹;

⁵⁴ Tees Valley Combined Authority (2020) Strategic Transport Plan 2020-2030. Available at: <https://teesvalley-ca.gov.uk/about/wp-content/uploads/sites/2/2023/07/STP-Main-Report-Design-JaN20-4.pdf> [Accessed 24/01/2025].

⁵⁵ Department for Environment, Food and Rural Affairs (2023) The air quality strategy for England. Available at: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england> [Accessed 24/01/2025].

⁵⁶ Department for Environment, Food and Rural Affairs (2019) Clean Air Strategy 2019. Available at: <https://assets.publishing.service.gov.uk/media/5c3b9debe5274a70c19d905c/clean-air-strategy-2019.pdf> [Accessed 24/01/2025].

⁵⁷ UK Government (2023) Environmental Improvement Plan; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1168372/environmental-improvement-plan-2023.pdf [Accessed 24/01/2025].

⁵⁸ UK Government (2020) The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

⁵⁹ Department for Environment, Food and Rural Affairs (2022) Local Air Quality Management Policy Guidance PG(22). Available at: <https://laqm.defra.gov.uk/wp-content/uploads/2023/11/LAQM-Policy-Guidance-2022.pdf> [Accessed 24/01/2025].

⁶⁰ Environment Agency and Department for Environment, Food and Rural Affairs (2024) Air emissions risk assessment for your environmental permit. Available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> [Accessed 24/01/2025].

⁶¹ Institute of Air Quality Management (2024) Guidance on the Assessment of Dust from Demolition and Construction (Version 2.2). Available at: <https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf> [Accessed 24/01/2025].

- IAQM Land-Use Planning & Development Control: Planning for Air Quality (2017)⁶²;
- Large Combustion Plant (LCP) BAT Reference (BREF) document (2017)⁶³;
- Guidance Review of emerging techniques for hydrogen production from methane and refinery fuel gas with carbon capture (2023)⁶⁴;
- Environment Agency: Hydrogen production with carbon capture: emerging techniques guidance (2023)¹⁷;
- Environment Agency Air Quality Management and Assessment Unit (AQMAU) recommendations for the regulation of impacts to air quality from amine-based post-combustion carbon capture plants (2021)⁶⁵;
- Environment Agency. BAT Review for Newbuild and Retrofit Post Combustion Carbon Dioxide Capture Using Amine-Based Technologies for Power and CHP Plants Fuelled by Gas and Biomass and for Post-Combustion Capture Using Amine-Based and Hot Potassium Carbonate Technologies on EfW Plants as Emerging Technologies under the IED for the UK⁶⁶ (2022); and
- Natural England (2018). Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001)⁶⁷.

Air Quality Standards Regulations 2010, including amendments (2016)

6.1.4 The Air Quality Standards Regulations 2010 (amended in 2016)⁵¹ define the policy framework for 12 air pollutants known to have harmful effects on

⁶² Environmental Protection UK/Institute of Air Quality Management (2017) Land-Use Planning & Development Control: Planning for Air Quality. Available at: <https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf> [Accessed 24/01/2025].

⁶³ European Commission (2017) Best Available Techniques (BAT) Reference Document for Large Combustion Plants. Available at: https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/JRC_107769_LCPBref_2017.pdf [Accessed 24/01/2025].

⁶⁴ Environment Agency (2023) Review of emerging techniques for hydrogen production from methane and refinery gas with carbon capture. Available at: https://assets.publishing.service.gov.uk/media/63b447c8d3bf7f36a8b6e5c5/Review_of_emerging_techniques_for_hydrogen_production_from_methane_and_refinery_fuel_gas_with_carbon_capture.pdf [Accessed 24/01/2025].

⁶⁵ Environment Agency (2021) AQMAU recommendations for the regulation of impacts to air quality from amine-based post-combustion carbon capture plants. Available at: <https://ukccsrc.ac.uk/wp-content/uploads/2021/11/AQMAU-C2025-RP01.pdf> [Accessed 24/01/2025].

⁶⁶ Gibbins, J., Lucquiaud, M. (2022) BAT Review for New-Build and Retrofit Post-Combustion Carbon Dioxide Capture Using Amine-Based Technologies for Power and CHP Plants Fuelled by Gas and Biomass and for Post-Combustion Capture Using Amine-Based and Hot Potassium Carbonate Technologies on EfW Plants as Emerging Technologies under the IED for the UK, Ver.2.0. Available at: <https://ukccsrc.ac.uk/best-available-technologybat-information-for-ccs/> [Accessed 24/01/2025].

⁶⁷ Natural England (2018) Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations. Available at: <https://publications.naturalengland.org.uk/file/5431868963160064> [Accessed 24/01/2025].

human health or the natural environment. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Other pollutants have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect health or the natural environment, i.e. after a relatively short period of exposure. Some pollutants have standards expressed in terms of both long- and short-term concentrations. Air quality limit values and objectives are quality standards for clean air. For the purposes of this assessment, the term 'air quality standard' will be used to refer to the national limit values.

- 6.1.5 Table 6.1 sets out the national air quality standards for nitrogen dioxide (NO₂), PM₁₀ and PM_{2.5} (particulate matter of 10 or 2.5 micrometres (µm) diameter or less respectively). These are the principal pollutants of concern for the assessment.

Table 6.1: Pollutant national air quality standards

Pollutant	Averaging period	Limit value/objective
Human Receptors		
Nitrogen dioxide (NO ₂)	Annual mean	40µg/m ³
	1-hour mean	200µg/m ³ [1]
Particulate matter (PM ₁₀)	Annual mean	40µg/m ³
	1-hour mean	50µg/m ³ [2]
Particulate matter (PM _{2.5})	Annual mean	20µg/m ³
		12µg/m ³ [3]
		10µg/m ³ [3]

[1] not to be exceeded more than 18 times a year (99.79th percentile)

[2] updated on 1 January 2020⁵⁸

[3] The Environmental Targets (Fine Particular Matter) (England) Regulations 2023 updated in 2023, to state that the annual mean level of PM_{2.5} in ambient air must be equal to or less than 10µg/m³ (“the target level”) by 31st December 2040⁶⁸. The Environmental Improvement Plan (2023)⁵⁷ sets an interim target of 12µg/m³, to be achieved by 31st January 2028. Due to the timescales of the Proposed Development, this assessment has considered the interim target of 12µg/m³.

- 6.1.6 There are specific objective pollutant concentrations for the protection of vegetation and ecosystems ('critical levels'), which are shown in Table 6.2. These are the gaseous concentrations in air below which harmful effects

⁶⁸ Department for Environment, Food and Rural Affairs (2023) Chief Planners Newsletter. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1140170/03_Chief_Planners_Newsletter_March_2023.pdf [Accessed 24/01/2025].

are unlikely to occur⁶⁹. The critical levels apply to locations more than 20 km from towns with more than 250,000 inhabitants or more than 5 km from other built-up areas, industrial installations or motorways. Critical levels are the air quality objectives for ecological receptors.

- 6.1.7 Table 6.2 shows the critical levels for the key pollutants of concern in this assessment.

Table 6.2: Critical levels for vegetation and ecosystems

Pollutant	Averaging period	Limit value/objective
Natural Environment (ecological receptors)		
Oxides of nitrogen (NO _x as NO ₂)	Daily mean	75µg/m ³
	Annual mean	30µg/m ³
Sulphur dioxide (SO ₂)	Annual mean	20µg/m ³
Ammonia (NH ₃)	Annual mean	1 µg/m ³ for lichen and bryophytes 3 µg/m ³ for other species

Consultation

- 6.1.8 The environmental health officers (EHO) at RCBC and SBC have been contacted via email in March 2024 to discuss and agree the scope and proposed methodology for the air quality assessment to be presented in the ES. The SBC EHO responded (March 2024) to confirm the methodology proposed was acceptable. The RCBC EHO also responded (July 2024) to confirm their acceptance of the proposed approach.

Baseline Conditions and Receptors

Study area

- 6.1.9 An initial desk-based baseline assessment has been undertaken to gather information on existing air quality conditions to evaluate the study area for the assessment of emissions to air. It is considered that a study area of up to 2 km from the Proposed Development Site is suitable to assess baseline conditions for human health receptors, and an extended study area of up to 15 km from the operational plant is appropriate for impacts to designated ecological receptors⁶⁰, in line with the Environment Agency risk assessment methodology.

⁶⁹ Centre for Ecology and Hydrology (CEH) and Air Pollution Information System (APIS) website defines critical levels as “concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge”

Existing Baseline

- 6.1.10 Baseline ambient air quality refers to the concentrations of relevant substances that are already present in the atmosphere from various sources such as industrial processes, commercial and domestic activities, agriculture, traffic and natural sources.

Sources of air pollution

- 6.1.11 Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are reduced or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A(1), A(2), Part B or medium combustion plant (MCP), and are regulated through the EPR^{22,52}. There are 33 Part A (1) processes and MCP processes within 2 km of the Proposed Development Site relevant to air quality. These are shown in Table 6.3. The impact of these processes are assumed to be represented in the background concentrations used in this assessment.

Table 6.3: Environment Agency regulated processes within 2 km of the Proposed Development Site

Site name	Permission number	Activity type description	Distance from the Proposed Development Site
WOOD GROUP UK LIMITED	EPR/SP3839RU	Burning any fuel in a furnace with a net rated thermal input of 20MW or more, but a rated thermal input of less than 50 MW	Permit for the existing CATS Terminal. Within or directly adjacent to Proposed Development Site boundary.
SEMBICORP UTILITIES (UK) LIMITED	EPR/LP3531UL	Combustion; any fuel =>50MW	Within or directly adjacent to Proposed Development Site boundary.
	EPR/XP3839XV		
	EPR/NP3438LK		
	EPR/NP3838LV	Incineration of Non-Hazardous Waste	
SUEZ RECYCLING AND RECOVERY UK LTD	EPR/XP3436WB	Incineration of Non-Hazardous Waste	Within or directly adjacent to Proposed Development Site boundary.
	EPR/DP3104SC		~1km south-west

Site name	Permission number	Activity type description	Distance from the Proposed Development Site
SABIC UK PETROCHEMICALS LIMITED	EPR/BS3590IE	Combustion; any fuel =>50MW	~100 m south
	EPR/TP3139UR	Incineration of hazardous waste	Within or directly adjacent to Proposed Development Site boundary.
	EPR/BU4520IZ	Combustion; any fuel =>50MW	~220 m north and south
	EPR/BU4503IW	Combustion; any fuel =>50MW	~750 m west
	EPR/LP3335RM	Combustion; any fuel =>50MW	~700 m south
UNIVERSAL MATTER GBR LIMITED	EPR/EP3731CX	Carbon; Producing Carbon etc. by Incineration/Graphitisation	~800 m south
LIGHTHOUSE GREEN FUELS LIMITED	EPR/PP3837JJ	Incineration of Non-Hazardous Waste	~1.2 km south
	EPR/PP3837JN		~500 m east
HARTREE PARTNERS POWER & GAS COMPANY (UK) LIMITED.	EPR/NP3331QY	New MCP	~740 m west
MGT TEESSIDE LIMITED	EPR/TP3538GF	Combustion; any fuel =>50MW	~1 km west
FCC WASTE SERVICES (UK) LIMITED	EPR/ZP3309LW	Incineration of Non-Hazardous Waste	~1.5 km north-west
FINE ORGANICS LIMITED	EPR/PP3439GG	Carbon disulphide or ammonia; ammonia release to air (any chemical manufacture not refrigerant use)	Within or directly adjacent to Proposed Development Site boundary.
FINE ENVIRONMENTAL SERVICES LIMITED	EPR/ZP3438CF	Incineration of hazardous waste	Within or directly adjacent to Proposed Development Site boundary.
CONOCOPHILLIPS (U.K.) TEESSIDE OPERATOR LIMITED	EPR/QP3004PD	Large combustion plant > 50MW. Incineration of hazardous waste	Within or directly adjacent to Proposed Development Site boundary.

Site name	Permission number	Activity type description	Distance from the Proposed Development Site
EDF ENERGY NUCLEAR GENERATION LIMITED	EPR/BM4295IK	Combustion; any fuel =>50mMW	~1.6 km north
AUGEAN NORTH LIMITED	EPR/BV1402IC	Combustion; Waste derived fuel	Within or directly adjacent to Proposed Development Site boundary.
VENATOR MATERIALS UK LIMITED	EPR/TP3532PK	Combustion; any fuel =>50MW	~1.3 km north-west
ANGLIAN WATER SERVICES LTD	EPR/KP3538SN	Combustion; any fuel =>50MW	~900 m north
SLB 2020 LIMITED	EPR/VP3606BL	Combustion; any fuel =>50MW	~700 m south
NET ZERO TEESSIDE POWER LIMITED	EPR/PP3501LR	Combustion; any fuel =>50MW	Within or directly adjacent to Proposed Development Site boundary.
HIGHFIELD ENVIRONMENTAL LIMITED	EPR/RP3531DV	Burning any fuel in a furnace with a net rated thermal input of 20MW or more, but a rated thermal input of less than 50MW	~300 m east
SALTHOLME NORTH POWER LIMITED	EPR/LP3300PZ	Combustion; any fuel =>50MW	Within or directly adjacent to Proposed Development Site boundary.
SALTHOLME SOUTH POWER LIMITED	EPR/XP3106PT	Combustion; any fuel =>50MW	Within or directly adjacent to Proposed Development Site boundary.
MARLOW FOODS LIMITED	EPR/FP3844QX	MCP	~200 m west
BASF PUBLIC LIMITED COMPANY	EPR/WP3606LN	Incineration of hazardous waste	~1.4km south-west
UNIVAR SOLUTIONS UK LTD	EPR/VP3729SX	MCP	~1.3km south-west

Local air quality management

- 6.1.12 The Environment Act 2021⁷¹ requires local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy⁷⁰. Where objectives are not predicted to be met, local authorities must declare the area as an AQMA.
- 6.1.13 A review of the Defra website⁷¹ shows that there are no AQMA in the RCBC or SBC administrative areas.

Local Monitoring

- 6.1.14 The Proposed Development is located within the RCBC and SBC local authorities. The most recent air quality annual status reports (ASR)^{72, 73} have been reviewed to identify monitoring sites located within 2 km of the Proposed Development Site.

Automatic Monitoring

- 6.1.15 SBC and RCBC both operate automatic monitoring sites, and each operate one automatic monitor within 2 km of the Proposed Development Site, as outlined in Table 6.4

Table 6.4: Automatic Monitoring Sites within 2 km of the Proposed Development Site

Local Authority	Site ID	OS grid reference		Site type
		X	Y	
Stockton-on-Tees Borough Council	UKA00153	446928	523597	Industrial
Redcar and Cleveland Borough Council	Redcar Dormanstown	458379	523486	Suburban

- 6.1.16 Monitored NO₂ concentrations at these automatic monitoring sites are reported in Table 6.5. The results at the monitoring sites show that concentrations of NO₂ are well below the air quality objective (40µg/m³) for annual mean NO₂. The concentration recorded in 2022 (the most recent year for which monitoring data is available in SBC) was 12.9µg/m³ and was 9.0µg/m³ in 2023 for the Dormanstown monitor.

⁷⁰ Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland (2007) National Air Quality Statement. Available at <https://assets.publishing.service.gov.uk/media/5a758459ed915d731495a940/pb12654-air-quality-strategy-vol1-070712.pdf> [Accessed 24/01/2025].

⁷¹ Department for Environment Food and Rural Affairs (n.d) Air Quality Management Areas website. Available at: <https://uk-air.defra.gov.uk/aqma/list> [Accessed 24/01/2025].

⁷² Redcar and Cleveland Council (2024) Air Quality Annual Status Report (ASR). Available at: <https://www.redcar-cleveland.gov.uk/sites/default/files/2024-11/Annual%20Status%20Report%20-%20Air%20Quality%20-%202024.pdf> [Accessed 24/01/2025].

⁷³ Stockton-on-Tees Borough Council (2024) Air Quality Annual Status Report. Available at: <https://www.stockton.gov.uk/air-pollution> [Accessed 24/01/2025].

Table 6.5: Automatic annual mean monitoring results 2019-2023

Site ID	NO ₂ annual mean concentration (µg/m ³) ^a				
	2019	2020	2021	2022	2023
UKA00153	16.5	13.0	13.0	12.9	-
Redcar Dormanstown	9.0	9.0	11.0	10.0	9.0

Diffusion Tube Monitoring

6.1.17 There are several diffusion tube monitoring locations within 2 km of the Proposed Development Site, outlined below in Table 6.6.

Table 6.6: Diffusion Tube Monitoring Sites within 2 km of the Proposed Development Site

Local Authority	Site ID	Site location	OS grid reference		Site type
			X	Y	
Redcar and Cleveland Borough Council	R17, R18, R19	West Lane, Grangetown	458379	523486	Suburban
	R27	West Lane	454712	520678	Roadside
	R51	Broadway	455379	520543	Suburban
	R52	West Dyke Road	460292	524876	Suburban
	R58	Fabian Road	455518	519353	Roadside
	R59	Redcar Road	460869	523657	Roadside
	R60	Flatts Lane	454864	517813	Roadside
	R61	St Joseph's Court	459695	524414	Roadside
	R62	Stirling Road	461308	523946	Suburban
Stockton-on-Tees Borough Council	S09	Marsh House Avenue	446383	523972	Roadside

6.1.18 Monitored NO₂ concentrations from 2019 to 2023 are reported in Table 6.7. The results at monitoring site R17, R18 and R19 provide the closest monitoring data for the Proposed Development Site for RCBC. The data shows that concentrations of NO₂ are well below the air quality objective (40µg/m³) for annual mean NO₂. The maximum concentration in 2023 was recorded at R27 and was 21.1µg/m³. This suggests concentrations of NO₂ in the vicinity of the Proposed Development Site are well below the air quality objective. It is expected that concentrations will remain below the objective in the future, based on the monitoring data in Table 6.7.

Table 6.7: Diffusion tube annual mean NO₂ monitoring results 2019-2023

Site ID	Site location	NO ₂ annual mean concentration (µg/m ³) ^a				
		2019	2020	2021	2022	2023
R17, R18, R19	West Lane, Grangetown	15.2	13.2	11.5	11.7	11.6
R27	West Lane	-	11.7	12.1	11.8	21.1
R51	Broadway	-	-	13.8	12.3	11.5
R52	West Dyke Road	-	16.3	15.7	14.9	14.8
R58	Fabian Road	-	-	13.8	12.3	12.9
R59	Redcar Road	-	-	13.9	14.0	13.0
R60	Flatts Lane	-	-	16.9	17.7	16.0
R61	St Joseph's Court	-	-	-	11.7	11.0
R62	Stirling Road	-	-	-	9.3	9.0
S09	Marsh House Avenue	19.0	12.1	16.5	13.4	-
^a Mean concentrations have been bias adjusted. Means have been annualised in accordance with LAQM Technical Guidance, if valid data capture is less than 75%. "-" denotes that no data is available.						

Background Concentrations

- 6.1.19 The Defra website⁷⁴ includes estimated background pollutant concentrations for NO_x, NO₂, PM₁₀, PM_{2.5} for each 1 km-by-1 km OS grid square in the UK.
- 6.1.20 The average 2023 Defra background pollutant concentrations for the 1 km grid squares that intersect the Proposed Development Site is shown below in Table 6.8. The data shows that the concentrations are below the national air quality standards for NO₂ (40µg/m³), PM₁₀ (40µg/m³) and PM_{2.5} (20µg/m³ (interim target of 12µg/m³ by 2028)).

Table 6.8: Defra's estimates 2023 background concentrations of NO₂, NO_x, PM₁₀ and PM_{2.5}

OS Grid Square	Annual mean concentration (µg/m ³)			
	NO ₂	NO _x	PM ₁₀	PM _{2.5}
Average	13.4	18.2	9.9	5.6

Human Receptors

- 6.1.21 As noted in Section 2.4, residential receptors are located immediately to the east of the Proposed Development Site along Broadway West, Wilton

⁷⁴ Department for Environment Food and Rural Affairs (n.d) Background Mapping data for local authorities – 2021. Available at: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021> [Accessed 24/01/2025].

Avenue and Hobson Avenue and west of the Proposed Development Site at Cowpen Lane. There are a large number of residential receptors within 2 km of the Proposed Development Site, predominantly within the settlements of Cowpen Bewley, Redcar, Wolviston and Billingham.

- 6.1.22 In addition to the residential receptors, there are a number of other sensitive receptors close to (within 1 km of) the Proposed Development Site identified in Table 2.2.
- 6.1.23 At the assessment stage, a final list of receptors will be defined once traffic data and construction activity data are available.

Ecological Receptors

- 6.1.24 There are a number of ecological receptors located adjacent to and in the vicinity of the Proposed Development Site outlined in Table 2.1 (proximity to the HPF Area) and Table 2.3 (proximity to the Hydrogen Pipeline(s)). These include the following:
- Teesmouth and Cleveland Coast SSSI, Ramsar, SPA, located immediately adjacent to the west of the HPF Area;
 - Teesmouth NNR, located adjacent to the west of the HPF Area;
 - Eston Pumping Station LWS, RSPB Saltholme and Cowpen Bewley Woodland Country Park LNR/ LWS located immediately adjacent to the Proposed Development Site (Hydrogen Pipeline(s)); and
 - Other LWS including Greatham Creek, Greatham Creek LWS/ Greatham Creek North Bank Saltmarsh and Greenabella Marsh LWS, located to the north of the HPF Area.
- 6.1.25 At the assessment stage, the list of receptors will be further defined once the design and Order Limits are fixed.
- 6.1.26 Critical load criteria for the deposition of nutrient nitrogen and acidifying species are dependent on the habitat type and species present, and therefore are specific to the sensitive receptors considered within the assessment. The critical levels are outlined earlier in Table 6.2. The data on critical loads from the Air Pollution Information System (APIS) will be used to define air quality assessment level concentrations at identified statutory designated ecological receptors within 15 km of the Proposed Development Site considered sensitive to nitrogen deposition and these will be presented in the ES.

Future Baseline

- 6.1.27 Background concentrations of pollutants are expected to decrease in the future due to improvements in vehicle technology and policy changes. However, to provide a conservative prediction of pollutant concentrations in

the future, the current baseline background concentrations from 2023 will be used for the future operational assessment scenarios, assuming no improvement in national air quality conditions. Similarly, for the assessment of the construction phase, current background concentrations will be used.

- 6.1.28 The future year without the development in place will be reviewed and assessed in the ES and compared to the future year with the development in situ.

Potential Impacts

- 6.1.29 This section identifies potential impacts in relation to the construction, operation and decommissioning of the Proposed Development.
- 6.1.30 The approach to assessment of cumulative and in-combination impacts and effects, which will be considered in the ES, is set out in Section 5.2 of this EIA Scoping Report.

Construction

Construction Dust

- 6.1.31 There is potential for impacts resulting from construction activities due to changes in pollutant concentrations or dust deposition. The potential impacts that may arise as a result of demolition works and construction works for the Proposed Development are dust deposition, resulting in the soiling of surfaces; visible dust plumes; and elevated PM₁₀ and PM_{2.5} concentrations as a result of dust generating activities on site.
- 6.1.32 A construction dust assessment is therefore **Scoped In** and will be undertaken for the ES. Potential demolition and construction effects of the Proposed Development on local air quality will be assessed using the qualitative approach described in the IAQM⁶¹ guidance.

Construction Traffic

- 6.1.33 There is also potential for impacts due to traffic movements associated with demolition and construction. While the exact construction traffic volumes are not yet known at this stage, the anticipated worst-case scenario is a peak construction worker number of approximately 550 (outlined in Section 3.5) which would conservatively equate to around 1,100 two-way worker vehicle movements per day during the peak of construction, (outlined in Section 3.6).
- 6.1.34 The volume of Heavy Duty Vehicle (HDV) on the network is predicted to be at its maximum approximately 300 two-way movements per day (150 one-way movements) during the peak civil engineering works period.
- 6.1.35 The criteria contained in the Environmental Protection UK (EPUK)/ IAQM

land use guidance document⁶² has been used to evaluate whether further assessment is advised. As the Proposed Development is not within or adjacent to an AQMA, the following criteria are relevant:

- a change of Light Duty Vehicle (LDV) flows of more than 500 annual average daily traffic (AADT) movements; or
- a change of HDV flows of more than 100 AADT movements.

6.1.36 On the basis of the above estimates, it is anticipated that the EPUK/ IAQM screening criteria would be exceeded for the construction phase, and therefore construction road traffic emissions are **Scoped In** to the assessment in relation to both human health and ecological receptors. Prior to modelling being undertaken, updated traffic data estimates will be re-screened using the relevant criteria from the EPUK/ IAQM best practice guidance document.

Operation

Point Source Emissions

6.1.37 During normal operation, the auxiliary boiler stacks and generating station stack would be the primary sources of emissions from the HPF and >50MWth generating station. These would give rise to combustion emissions (NO_x and CO) and potentially NH₃ if abatement of NO_x using selective catalytic reduction (SCR) is used to comply with BAT achievable emission levels (AEL). An assessment of combustion emissions is therefore **Scoped In**.

6.1.38 The absorber units that form part of the CCP for the HPF, described in Section 3.2, are closed loop units with no stack and so do not give rise to point source emissions of amine, amine degradation products or other emissions associated with amine-based CCP. There is potential for trace amine carryover within the process; however this is expected to be negligible and any such emissions either are retained in the produced CO₂ or H₂ streams that are sent off-site via pipeline or vented to the on-site flare and fully combusted. As there is no point source emission, the assessment of potential emissions to air from amines or amine degradation products is therefore proposed to be **Scoped Out**. This is consistent with the position taken by the Environment Agency on the issued environmental permit for the Hynet-linked Essar Oil permit application for a blue HPF (ref: EPR/FP3139FN/V013, May 2023) which does not require monitoring of or the setting of emission limit values (ELV) for any amine species or amine degradation products associated with the use of carbon capture equipment, since it is recognised that no such emissions to atmosphere can take place from such an installation.

- 6.1.39 There is also the potential for the Proposed Development to impact local air quality and sensitive receptors due to flaring for regular maintenance and in the event of an emergency. This would result in operational exhaust emissions of NO_x. In line with the Environment Agency guidance⁶⁴, venting or flaring of hydrogen will be avoided wherever possible and emissions of hydrogen would be prevented.
- 6.1.40 There is no air quality objective for H₂, so this is not considered further. However, given that there is potential for emissions to air of NO_x, a further assessment from flaring is **Scoped In**.
- 6.1.41 Unless otherwise stated, emissions from operational plant are **Scoped In** to further assessment during the ES.

Operational traffic

- 6.1.42 The operational phase will give rise to an increase in vehicle movements associated with permanent staffing requirements, visitors and deliveries. As described in Section 3.2, up to 140 (two-way i.e. 70 in/ 70 out) additional worker vehicles per day on a shift basis could occur during operation of Phase 2, combined with HGV movements for consumables/ deliveries. Such operational traffic movements are not predicted to exceed the screening criteria (paragraph 6.1.35) and therefore a detailed assessment of operational road traffic emissions/ modelling has been **Scoped Out** of the assessment. This will be re-confirmed at the assessment stage of the EIA if updated traffic estimates require this.
- 6.1.43 The vehicle movements described in paragraph 3.2.40 relating to major turnarounds/ planned maintenance periods are not expected to exceed the EPUK/ IAQM screening criteria outlined above and are also **Scoped Out** of the assessment.

Decommissioning

- 6.1.44 The potential impacts that may arise as a result of demolition works for decommissioning are dust deposition, resulting in the soiling of surfaces; visible dust plumes; and elevated PM₁₀ and PM_{2.5} concentrations as a result of dust generating activities at the Proposed Development Site. A dust assessment is **Scoped In** to assess appropriate mitigation for the decommissioning phase that could be secured via the DEMP.
- 6.1.45 While decommissioning traffic volumes are not yet known at this stage, it is expected that they will be similar to, or less than construction traffic volumes and therefore the EPUK/ IAQM screening criteria could be exceeded. On a precautionary basis, a decommissioning air quality road traffic appraisal is **Scoped In** and would take the form of a sensitivity test to evaluate the likelihood of significant effects, using available traffic estimates (refer to

Section 6.13).

Embedded Mitigation

Construction

- 6.1.46 A CEMP will form part of the embedded mitigation. A Framework CEMP will be prepared as part of the Application, providing an overview of relevant air quality management measures, including proposals for good site practice to reduce dust, trackout and emissions from non-road mobile machinery (NRMM), providing a framework of measures and principles to be taken forward and developed further by the appointed contractor via the Final CEMP. The Final CEMP will be secured by the draft DCO.
- 6.1.47 Construction dust mitigation measures will be considered in order for the effects from the construction phase to be considered not significant according to IAQM guidance⁶¹, however the degree of mitigation will be evaluated at the assessment stage. The mitigation will be included in the Air Quality chapter, in the Framework CEMP, and will include relevant measures set out in the IAQM guidance.
- 6.1.48 Mitigation for construction traffic emissions would be via the Framework CTMP and Framework CWTP.

Operation

- 6.1.49 The Proposed Development will be designed such that process emissions to air comply with the ELV requirements specified in the IED, or, if tighter, the LCP BREF, where relevant. This will be regulated by the Environment Agency through the Environmental Permit required for the operation of the Proposed Development, applied for separate to the DCO. The Environmental Permit may also include additional ELV for species not covered under the IED or LCP BAT Reference Document. The Environmental Permit will outline routine inspection and maintenance activities and monitoring to avoid significant environmental effects.
- 6.1.50 Operational phase mitigation may be considered for hydrogen flaring; however, the degree of mitigation will be reviewed at the assessment stage. As previously described, in line with the Environment Agency guidance on blue hydrogen¹⁷, intermittent venting or flaring of hydrogen will be avoided as far as reasonably practicable and emissions of hydrogen would be prevented. This guidance note lists techniques to achieve this, such as: flaring rather than venting of hydrogen, where emissions cannot be reduced and where practicable.
- 6.1.51 Any mitigation will be included in the Air Quality chapter of the ES, and where relevant, embedded in the EMS, following measures set out in the

Environment Agency guidance⁶⁴.

- 6.1.52 Mitigation will not be considered for the operational phase traffic of the Proposed Development as this element is **Scoped Out**.

Decommissioning

- 6.1.53 The mitigation included in the Air Quality chapter of the ES for construction, following measures set out in the IAQM guidance⁶² is likely to be equally applicable for the decommissioning phase which would be set out at the appropriate time in a DEMP. The need for a DEMP would be secured via a requirement of the draft DCO and stated in the commitments register that accompanies the Application. It is envisaged that mitigation for decommissioning traffic will form part of the DEMP.

Summary of Potential Likely Significant Effects

- 6.1.54 Table 6.9 provides a summary of the air quality elements that are proposed to be **Scoped In** or **Scoped Out** from the air quality assessment, along with a justification for that decision.

Table 6.9: Air Quality elements scoped in or scoped out of future environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline				
Construction dust assessment	Construction	✓		Construction activities have the potential to result in dust soiling, and potential human health or ecological impacts. A dust assessment is Scoped In to evaluate suitable levels of mitigation measures.
Construction traffic assessment	Construction	✓		It is likely that construction traffic movements would exceed the EPUK/ IAQM screening criteria.
Operational plant assessment	Operation	✓		It is likely that a number of point source emissions from the HPF, including potential flaring, and from the generating station could result in emissions that require assessment.
Operational traffic assessment	Operation		✓	It is unlikely that operational traffic movements will exceed the EPUK/ IAQM screening

Element	Phase	Scoped In	Scoped Out	Justification
				criteria, and an assessment is Scoped Out .
Decommissioning dust assessment	Decommissioning	✓		The decommissioning may impact air quality due to the potential fugitive emissions of dust from demolition works. A dust assessment is Scoped In to evaluate suitable levels of mitigation measures for a future DEMP.
Decommissioning traffic assessment	Decommissioning	✓		It is likely that decommissioning traffic movements could exceed the relevant screening criteria.

Proposed Assessment Methodology

6.1.55 The overall approach to the air quality assessment comprises:

- a review of the existing air quality conditions at, and in the vicinity of, the Proposed Development Site;
- an assessment of the potential changes in air quality arising from the construction, commissioning, operation and decommissioning of the Proposed Development; and
- formulation of mitigation measures, where appropriate, to reduce any likely significant adverse effects on air quality.

Baseline Data Collection

6.1.56 The desk-based review undertaken for the EIA Scoping Report will be reviewed and updated at ES stage to confirm air quality conditions around the Proposed Development Site. The following sources will be used to collate baseline data:

- The Environment Agency website⁷⁵;
- The Defra LAQM website⁵⁹;
- RCBC ASR⁷²;
- SBC ASR⁷³; and
- APIS.

⁷⁵ Environment Agency (n.d) Environmental Permitting Regulations – Installations. Available at: <https://environment.data.gov.uk/public-register/view/search-industrial-installations> [Accessed 28/01/2025].

- 6.1.57 The review will confirm the main sources of air pollution, local air quality monitoring data and local background pollutant concentrations, where these are updated from the data presented in this section in the ES.

Significance Criteria

Construction Dust

- 6.1.58 The receptors can be human or ecological and are selected based on their sensitivity to dust soiling and PM₁₀ exposure. Sensitive receptors are described in paragraph 6.1.83 - 6.1.84.
- 6.1.59 The methodology to be adopted in relation to construction dust is presented in Appendix D. IAQM construction dust guidance notes that following the implementation of appropriate best practice mitigation measures, the overall effect can be considered to be not significant.

Construction Traffic

- 6.1.60 Sensitive human receptors are residential, schools and hospitals and sensitive ecological receptors are those located along the modelled road network, which are known to be sensitive to nitrogen deposition.
- 6.1.61 The 2017 EPUK/IAQM guidance note 'Land-Use Planning & Development Control'⁶² provides an approach to determining the air quality impacts resulting from a Proposed Development and the overall significance of local air quality effects arising from a Proposed Development.
- 6.1.62 Firstly, impact descriptors are determined based on the magnitude of incremental change as a proportion of the relevant assessment level, in this instance the annual mean NO₂, PM₁₀, and PM_{2.5} objectives. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the annual mean NO₂, PM₁₀, and PM_{2.5} objectives.
- 6.1.63 If the impact descriptor is negligible or slight, this is considered to not have a significant effect. The overall significance is determined by professional judgement.
- 6.1.64 The assessment framework for determining impact descriptors at each of the assessed receptors is shown in Table 6.10.

Table 6.10: Impact descriptors

Annual average concentrations at receptor in the assessment years	% Change in concentrations relative to annual mean NO ₂ and PM ₁₀ objectives			
	1	2 - 5	6 - 10	>10
75% or less of objective	Negligible	Negligible	Slight	Moderate
76 – 94% of objective	Negligible	Slight	Moderate	Substantial
95 – 102% of objective	Slight	Moderate	Moderate	Substantial
103 – 109% of objective	Moderate	Moderate	Substantial	Substantial
110% or more of objective	Moderate	Substantial	Substantial	Substantial
Note: Changes in pollutant concentrations of less than 1% i.e. <0.5% would be described as negligible				

6.1.65 The guidance also provides advice for determining the magnitude of change for hourly mean NO₂ concentrations, which is shown in Table 6.11. The impact descriptor is determined by considering the process contribution (PC) only. However, in assessing the significance, consideration is also given to total pollutant concentrations, including background concentrations, and comparison of these with the hourly mean NO₂ objective.

Table 6.11: Magnitude of change for hourly mean NO₂ concentrations

Changes in hourly mean concentrations at receptor in the assessment year	Magnitude of change	Impact descriptors
<10% of hourly mean NO ₂ threshold	Imperceptible	Negligible
10 – 20% of hourly mean NO ₂ threshold	Small	Slight
20 – 50% of hourly mean NO ₂ threshold	Medium	Moderate
>50% of hourly mean NO ₂ threshold	Large	Substantial

6.1.66 The impact descriptors at each of the assessed receptors can then be used as a starting point to make a judgement on the overall significance of effect of a Proposed Development, however other influences would also need to be taken into account, such as:

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

- 6.1.67 Professional judgement will be used to determine the overall significance of effects of the Proposed Development, however in circumstances where the Proposed Development can be judged in isolation, it is likely that a ‘moderate’ or ‘substantial’ impact will give rise to a likely significant effect and a ‘negligible’ or ‘slight’ impact will not result in a likely significant effect.

Operational Plant

Human receptors

- 6.1.68 The Environment Agency’s EPR risk assessment screening criteria guidance²³ describes how insignificant PC can be screened out of further analysis.
- 6.1.69 Step 1: The PC can be considered insignificant and require no further investigation if:
- the long-term PC is $\leq 1\%$ of the long-term environmental standard; and
 - the short-term PC is $\leq 10\%$ of the short-term environmental standard.
- 6.1.70 Step 2: For those contributions not screened out as insignificant, the predicted environmental concentration (PEC i.e. the background concentration + PC), must be tested. Concentrations are considered potentially significant if:
- the long-term PEC is $> 70\%$ of the long-term standard; or
 - the short-term PC is $> 20\%$ of the short-term standard minus twice the annual mean background concentration.

Ecological receptors

- 6.1.71 For statutory designated ecological sites (SPA, SAC, Ramsar, SSSI) emissions will be screened as not significant where:
- the short-term PC is less than 10% of the short-term EQS for protected conservation areas; and
 - the long-term PC is less than 1% of the long-term EQS for protected conservation areas; or where the long-term PC is $> 1\%$ and PEC is $< 70\%$ of the long-term EQS.
- 6.1.72 The short-term PEC does not need to be calculated for ecological sites, and only the short-term PC will be used for the initial screening of potential impacts.
- 6.1.73 For non-statutory designated nature conservation designations, PCs can be screened out as unlikely to give rise to significant effects where both the short-term and long-term PC is less than 100% of the EQS. Where the PC exceed the screening criteria, dispersion modelling will be undertaken. Reference will be made to the APIS site-specific critical load tool.
- 6.1.74 Predicted PC or PEC that meet the above criteria are deemed to be

insignificant. When impacts cannot be screened out as being insignificant using the thresholds above, further evaluation of the significance requires will be undertaken in consultation with the ecological specialists.

Impact Assessment Approach – Construction and Decommissioning

Construction and Decommissioning Dust

- 6.1.75 The construction phase effects of the Proposed Development will be assessed using the qualitative approach described in the IAQM guidance⁶¹. The guidance also applies to the assessment of the decommissioning phase activities. Refer to Appendix D (Volume II) for further information.

Construction and Decommissioning Traffic

- 6.1.76 A dispersion modelling assessment will be undertaken to evaluate the potential effects and their likely significance for construction phase traffic. A sensitivity test using reasonable traffic estimates for the decommissioning phase will be used to evaluate any likely significant effects.

Impact Assessment Approach - Operation

Operational Plant

- 6.1.77 Due to the nature of the proposed activities at the HPF, operational effects on air quality are expected to be limited, including auxiliary boilers and generation facility, which may give rise to emissions of NO_x and CO. These operational emissions will be assessed using the Environment Agency's Risk Assessment Methodology⁶⁰ to identify where proposed emissions can be screened out as being unlikely to cause significant effects. Refer to paragraphs 6.1.68 - 6.1.74.
- 6.1.78 Detailed dispersion modelling will be used to calculate pollutant concentrations at identified receptors where emissions cannot be screened out. The likely significance of long-term and short-term effects will be based on IAQM guidance.
- 6.1.79 For ecological receptors where the PC or PEC cannot be screened out, the results of dispersion modelling will be reported in an appendix of the Air Quality ES chapter. An assessment of the potential for likely significant effects (LSE) on the relevant statutory and non-statutory designated ecological receptor sites will be undertaken and the results reported within the Biodiversity Chapter of the ES and Habitat Regulations Assessment (HRA).
- 6.1.80 Emissions to air from the CCP are not expected as the process is a closed

loop system (i.e. no emissions of amines).

6.1.81 Hydrogen generation facilities have the potential for flaring and venting, which could give rise for potential air quality impacts. Venting is not proposed as part of the proposed operations and is not considered further. There is no planned flaring of hydrogen during normal operation. Hydrogen flaring may occur during emergency scenarios and for regular maintenance activities. The Environment Agency guidance document for blue hydrogen notes that:

- flaring should be used over venting where emissions cannot be reduced and where practicable;
- flaring should be avoided as part of routine operations⁷⁶;
- continuous or intermittent venting of hydrogen should be avoided or reduced, whether for operational or safety reasons;
- flaring devices should be designed to improve efficient combustion when flaring; and
- monitoring and reporting of flaring should be carried out.

6.1.82 Since flaring may be carried out for maintenance activities or used in an emergency, detailed dispersion modelling will be undertaken to assess the potential air quality impacts.

Receptors

Human Receptors

6.1.83 Sensitive receptors are defined as those residential/ schools/ hospitals that are likely to experience a change in pollutant concentrations and/ or dust nuisance due to the construction or operation of the Proposed Development and have been identified in paragraphs 6.1.21 - 6.1.22 including receptors within the settlements of Greatham, Cowpen Bewley, Redcar, Wolviston and Billingham. At the assessment stage, a final list of human health receptors will be defined once traffic data and construction activity data are available.

Ecological Receptors

6.1.84 There are several ecological receptors located adjacent to and in the vicinity of the Proposed Development Site. An outline of those closest to the Proposed Development site is provided in paragraph 6.1.24. These receptors, including further information on the qualifying features of each designated site presented in Appendix E: Biodiversity Desk Study Results (Volume II) will be used to define the final receptor list for the ES.

⁷⁶ In addition to the EA guidance, there is also a UN launched goal of zero routine flaring by 2030. Available at: <https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030>

Assumptions, Limitations and Uncertainties

- 6.1.85 There is limited design information availability at the time of writing the EIA Scoping Report. The assessment within the EIA will be in-line with the latest available design information at the time of submission. Where design information is unknown or unavailable, conservative assumptions will be made.
- 6.1.86 There is also uncertainty associated with any modelling assessment, due to the inherent uncertainty of the dispersion modelling process itself. Despite this, the use of dispersion modelling is a widely applied and accepted approach for the prediction of impacts from industrial sources.

6.2 Biodiversity

Overview

- 6.2.1 This section sets out the proposed scope and methodology for assessment of effects of the Proposed Development on Biodiversity (terrestrial and aquatic). This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.2.2 This section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development, and Section 6.8: Marine Biodiversity (which addresses impacts below MHWS) of this EIA Scoping Report. This section is supported by the following figures (Appendix A) and appendices (Volume II):
- Appendix E – Biodiversity Desk Study Results.
 - Figure 6.2.1 – Statutory Designated Sites within 15 km of Proposed Development.
 - Figure 6.2.2 – Non-Statutory Designated Sites within 2 km of Proposed Development.
 - Figure 6.2.3 – Protected and Notable Habitats within 2 km of Proposed Development.

Legislation and Policy Context

- 6.2.3 The scope of the biodiversity assessment to be presented in the ES will be informed by relevant legislation, local planning policies, national and local biodiversity action plans (LBAP) which are applicable to Section 41 priority species/ habitats and the baseline conditions within the Proposed Development.
- 6.2.4 The following legislation, policy and guidance will be considered in the ES:

- Wildlife and Countryside Act (WCA) (as amended) (1981)⁷⁷;
- Countryside and Rights of Way Act (2000)⁷⁸;
- The Natural Environment and Rural Communities (NERC) Act (2006)⁷⁹;
- The Protection of Badgers Act (1992)⁸⁰;
- Council Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) (1992)⁸¹;
- Council Directive (2009/147/EC) on the Conservation of Wild Birds (Birds Directive), (2009)⁸²;
- Conservation of Habitats and Species Regulations ('Habitat Regulations') (2017)⁸³;
- Conservation of Habitats and Species Amendment (EU Exit) Regulations (2019)⁸⁴;
- Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora⁸⁵ (1975);
- Environment Act (2021)²¹; and
- Invasive Alien Species (Enforcement and Permitting) Order (2019)⁸⁶.

6.2.5 Relevant national, regional and local planning policies and guidance will also be considered as part of the ecological impact assessment (EcIA) including (but not be limited to):

- The Overarching NPS for Energy (EN-1) (2024)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (2024)²⁷;

⁷⁷ UK Government (1981) Wildlife and Countryside Act 1981.

⁷⁸ UK Government (2000) Countryside Rights of Way Act 2000.

⁷⁹ UK Government (2006) Natural Environment and Rural Communities Act 2006.

⁸⁰ UK Government (1992) Protection of Badgers Act 1992.

⁸¹ The Council of the European Communities (1992) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and wild flora and fauna.

⁸² The European Parliament and The Council of The European Union (2009) Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.

⁸³ UK Government (2010) The Conservation of Habitats and Species Regulations 2010.

⁸⁴ UK Government (2019) The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

⁸⁵ Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975)

⁸⁶ UK Government (2019) The Invasive Alien Species (Enforcement and Permitting) Order 2019.

- Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the Planning System (2005)⁸⁷;
- A Green Future: Our 25 Year Plan to Improve the Environment (2018)⁸⁸;
- The SBC Local Plan (2019)³⁰;
- RCBC Local Plan (2018)³¹;
- Tees Valley Biodiversity Action Plan (BAP) (2012)⁸⁹;
- Birds of Conservation Concern (BoCC) (2021)⁹⁰;
- The Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2018)⁹¹;
- CIEEM: Guidelines for Preliminary Ecological Appraisal (PEA) (2017)⁹²;
- Guidance on Nationally Significant Infrastructure Projects: Advice on Habitat Regulations Assessments (2024)⁹³; and
- Air emissions risk assessment for your environmental permit (2025)⁶⁰.

Consultation

6.2.6 Technical engagement commenced in 2022 and has been ongoing with a wide range of statutory and non-statutory bodies to discuss the approach to surveys and/ or BNG as appropriate including:

⁸⁷ Office of the Deputy Prime Minister (2005) Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the Planning System. Available at: <https://assets.publishing.service.gov.uk/media/5a78c5e7ed915d04220653ab/147570.pdf> [Accessed 24/01/2025].

⁸⁸ HM Government (2018) A Green Future: Our 25 Year Plan to Improve the Environment. Available at: <https://assets.publishing.service.gov.uk/media/5ab3a67840f0b65bb584297e/25-year-environment-plan.pdf> [Accessed 24/01/2025].

⁸⁹ Tees Valley Nature Partnership (2012) Tees Valley Biodiversity Action Plan. Available at: <https://safe.rbi-umbrella.com/http://teesvalleybiodiversity.org.uk/> [Accessed 24/01/2025].

⁹⁰ Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747. Available at <https://www.bto.org/sites/default/files/publications/bocc-5-a5-4pp-single-pages.pdf> [Accessed 24/01/2025].

⁹¹ The Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine. Available at: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf> [Accessed 24/01/2025].

⁹² The Chartered Institute of Ecology and Environmental Management (2017) Guidelines for Preliminary Ecological Appraisal, Second Edition. Available at: <https://cieem.net/wp-content/uploads/2018/01/Guidelines-for-Preliminary-Ecological-Appraisal-JaN2018-typo-edit.pdf>. [Accessed 24/01/2025].

⁹³ Planning Inspectorate (2024) Nationally Significant Infrastructure Projects: Advice on Habitats Regulations Assessments. Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-habitats-regulations-assessments> [Accessed 24/01/2025].

- Natural England;
- SBC;
- Environment Agency;
- Hospital of God;
- Industry Nature Conservation Association (INCA);
- RCBC;
- RSPB;
- Teesside Environmental Trust (TET); and
- Other relevant nature conservation bodies, as necessary.

6.2.7 Additional technical engagement and consultation will be carried out with statutory bodies and other organisations as advised by the EIA Scoping Opinion, once received. Relevant stakeholders will be contacted regarding the Proposed Development design and any considered avoidance and/ or mitigation strategies.

Assessment Methodology

6.2.8 The Ecological Impact Assessment (EclA), in accordance with good practice guidance issued by CIEEM, will focus on those ecological features that are ‘relevant’ as it is not advised in the assessment to address all ecological features with potential to occur.

Desk Based Assessment

6.2.9 A desk study was undertaken as part of the PEA by Arup in October 2023 and updated in February 2024, using publicly available data and data received through stakeholder consultation. Data was sought from, but not limited to, the following organisations:

- Multi-Agency Geographic Information for the Countryside (MAGIC)⁹⁴;
- Environmental Records Information Centre for the North East of England (ERIC NE)⁹⁵;
- British Trust for Ornithology’s (BTO) wetland bird survey (WeBS) data⁹⁶; and
- INCA.

⁹⁴ Department for Environment, Food and Rural Affairs (2024) MAGIC. Available at: <https://magic.defra.gov.uk/home.htm> [Accessed 24/01/2025].

⁹⁵ ERIC North East (2024) Data Request Form. Available at: <https://ericnortheast.org.uk/data-request-form/> [Accessed 24/01/2025].

⁹⁶ British Trust for Ornithology (2024) Wetland Bird Survey Data. Available at: <https://www.bto.org/our-science/projects/wetland-bird-survey/data> [Accessed 24/01/2025].

- 6.2.10 The Zol for biodiversity varies for the identified ecological receptors as set out in 6.2.11. The Zol identified for each receptor were informed by CIEEM EcIA guidelines, which is regarded as industry best practice guidance⁹¹. Information on biodiversity within the Zol of the Proposed Development Site has been gathered from a combination of the desk-based assessment and field surveys undertaken by INCA, Ecus and Arup.
- 6.2.11 The desk study identified records of statutory and non-statutory designated sites, priority and notable habitats and protected and notable species within the relevant Zol from the 'indicative Proposed Development Site'⁹⁷:
- international statutory designated sites, including, SPA, SAC and Ramsar Sites within a 15 km Zol of the Proposed Development Site;
 - national statutory designated sites, including SSSI within a 15 km Zol for the Proposed Development Site;
 - national statutory designated sites, including, NNR and LNR within a 2 km Zol of the Proposed Development Site;
 - non-statutory designated sites, including LWS within 2 km Zol of the Proposed Development Site; and
 - other relevant data, e.g. priority and notable habitats within 2 km Zol, and Ancient Woodland Inventory within 500 m Zol of the Proposed Development Site.
- 6.2.12 Only records from the previous 10 years were sought, as ecological conditions may change, making data older than 10 years unrepresentative of current conditions.

Baseline Conditions and Receptors

- 6.2.13 A suite of ecological surveys has already been completed between 2021 and 2024, covering the indicative Proposed Development Site which included the HPF Area, and part of the area required for the Hydrogen Pipeline(s) within the current Proposed Development Site. These surveys included:
- UK Habitats classification, condition assessment and invasive non-native species (INNS) surveys;
 - bat activity surveys and preliminary roost assessments (PRA);
 - breeding bird surveys;
 - wintering bird surveys;

⁹⁷ The indicative Proposed Development Site is used here as a term, recognising that this was a point in time snapshot and that the indicative order limits are likely to continue to evolve up to the point of submission of the Application.

- terrestrial invertebrate (Lepidoptera) surveys;
- great crested newts (GCN) (*Triturus cristatus*) habitat suitability index (HSI) assessments and environmental DNA (eDNA) surveys;
- water vole (*Arvicola amphibius*) surveys; and
- reptile surveys.

Habitats

6.2.14 Thirteen Priority Habitats (Section 41 of the NERC Act)⁷⁹ were identified within the indicative Proposed Development Site:

- coastal sand dunes;
- coastal saltmarsh;
- eutrophic standing waters;
- floodplain wetland mosaic and Coastal Floodplain Grazing Marsh;
- glasswort and other annuals colonising mud and sand;
- hedgerow;
- intertidal mudflats and sandflats;
- lowland Fens;
- lowland calcareous grassland;
- OMH on previously developed land;
- reedbeds;
- supralittoral rock; and
- wet woodland.

6.2.15 Other habitats within the Indicative Proposed Development Site comprised cropland, modified grassland, other neutral grassland, heathland and shrub, woodland, watercourses and sparsely vegetated land.

Notable Flora

6.2.16 Areas of Japanese rose (*Rosa rugosa*) and multiple cotoneaster species were identified within the Indicative Proposed Development Site during field surveys in 2023.

Bats

6.2.17 Field surveys identified common pipistrelle and noctule bats as the most common species within the Indicative Proposed Development Site in 2023 and 2024. Other species recorded included soprano pipistrelle, Nathusius' pipistrelle, *Myotis* sp., and brown long-eared bat (*Plecotus auratus*). Overall

bat activity is considered to be low to moderate due to the overall industrialised nature of the Proposed Development Site and the surrounding area. This significantly limits foraging and commuting habitats available to bats.

- 6.2.18 No potential roost features (PRF) were identified within the Indicative Proposed Development Site during the field surveys in 2023 and 2024. Trees identified were not of a sufficient age or size to support PRF and buildings provided negligible opportunities for roosting bats.

Birds - Breeding

- 6.2.19 Breeding bird surveys in 2023 identified a total of 87 species within or flying over the Indicative Proposed Development Site. Of these 87 species, a total of 29 species were identified as actively breeding (confirmed) or exhibiting behaviour suggestive of breeding (probable). Breeding bird surveys in 2024 identified 46 breeding species within the Indicative Proposed Development Site, west of the HPF Area.

Birds – Wintering

- 6.2.20 Wintering bird surveys have identified a total of 34 bird species were recorded within 250 m of the HPF Area during the 2021/ 2022 wintering bird season. A total of 82 bird species were recorded within the Indicative Proposed Development Site, north of the River Tees, during the 2022/ 2023 wintering bird season.

Terrestrial Invertebrates

- 6.2.21 Field surveys in 2023 and 2024 within the Indicative Proposed Development Site identified habitats of high and moderate importance for a range of invertebrate species, including those from *lepidoptera* and *odonata* taxa. A total of 19 species of butterfly and 103 species of moth were recorded from field surveys in 2023. Five butterfly species are of national importance, comprising the dingy skipper (*Erynnis tages*), grayling (*Hipparchia semele*), small blue (*Cupido minimus*), brown argus (*Aricia agestis*) and Essex skipper (*Thymelicus lineola*). Twelve 'suncommon grassland moth species were also recorded, comprising:

- Bordered sallow (*Pyrrhia umbra*);
- Eucosma hohenwartiana;
- Lesser treble-bar (*Aplocera efformata*);
- Small elephant-hawk moth (*Deilephila porcellus*);
- The gelechiids (*Aproaerema anthyllidella*);
- Aproaerema sangiella;

- *Chionodes distinctella*;
- *Oxypteryx wilkella*;
- *Depressaria badiella*;
- *Pyrausta despicata*;
- The plume moth (*Oidaematophorus lithodactyla*);
- Archer's dart (*Agrotis vestigialis*); and
- White colon (*Sideridis turbida*).

6.2.22 Additional field surveys in 2024 recorded eight species of butterfly and 140 moth species. Field surveys have not identified any terrestrial invertebrate species which are nationally rare or have statutory protection.

Amphibians (including GCN)

6.2.23 A desk study (as shown within Appendix E – Volume II) identified 105 waterbodies within 250 m of the Indicative Proposed Development Site. A total of 29 'suitable' waterbodies were screened and subject to HSI assessment in 2023 and 2024, 25 of which were then sampled for GCN eDNA due to 'good' or 'excellent' HSI scores. Only one waterbody located in Cowpen Bewley Woodland Park provided a positive result for GCN eDNA.

Water vole

6.2.24 Field surveys in 2024 identified habitats of high and moderate importance for water vole within the Indicative Proposed Development Site, west of the HPF Area near Saltholme. Within this study area, field signs of water vole in the form of latrines were identified along two watercourses.

Reptiles

6.2.25 No reptiles were identified within the Indicative Proposed Development Site during field surveys in 2022 and 2023.

Summary

6.2.26 In summary, the indicative Proposed Development Site provided valuable foraging, breeding and overwintering habitat for birds, foraging and commuting habitat for bats, foraging and burrow building opportunities for water vole and foraging, breeding and sheltering habitat for terrestrial invertebrates. Other species identified within the locality of the Indicative Proposed Development comprise badger (*Meles meles*), otter (*Lutra lutra*) and amphibians.

6.2.27 A gap analysis exercise has been completed since the completion of these field surveys to identify areas where further surveys are advised as a result

of:

- changes to the Proposed Development boundary; and
- time lapsed since survey completion.

6.2.28 The proposed approach to further surveys (and evaluation/ assessment) is outlined within paragraphs 6.2.77 - 6.2.123.

Existing Baseline

Designated Sites

6.2.29 All statutory and non-statutory designated sites within 15 km and 2 km of the Proposed Development Site respectively, are shown in Figure 6.2.1 and Figure 6.2.2 (Appendix A).

6.2.30 Five statutory designated sites were identified within the Proposed Development Site; Teesmouth and Cleveland Coast SPA, Teesmouth and Cleveland Coast Ramsar, Teesmouth and Cleveland Coast SSSI, Teesmouth NNR and Cowpen Bewley Woodland Country Park LNR.

6.2.31 The following statutory designated sites of international importance are located within 15 km of the Proposed Development (see Table 6.12).

Table 6.12: Internationally Important Statutory Designated Sites within 15 km of the Proposed Development Site.

Site Name	Distance/ direction from HPF Area	Distance/ direction from Hydrogen Pipeline(s)
Teesmouth and Cleveland Coast SPA	5 m west	0 m west
Teesmouth and Cleveland Coast Ramsar	5 m west	25 m east
Northumbria Coast Ramsar	12.8 km north	12.4 km north
Northumbria Coast SPA	12.8 km north	12.3 km north
Durham Coast SAC	12.8 km north	12.4 km north
North York Moors SAC	13.2 km south-east	8.2 km south
North York Moors SPA	13.2 km south-east	8.2 km south
Castle Eden Dene SAC	>15 km north-west	14.4 km north

6.2.32 The following statutory designated sites of national importance were identified within 10 km of the Proposed Development Site (see Table 6.13).

Table 6.13. Nationally Important Statutory Designated Sites within 10 km of the Proposed Site Boundary.

Site Name	Distance/ direction from HPF Area	Distance/ direction from Hydrogen Pipeline
Teesmouth and Cleveland Coast SSSI	Partly coincident	Partly coincident
Teesmouth NNR	5 m west	660 m north
Lovell Hill Ponds SSSI	9.2 km south-east	2.6 km south-east
Whitton Bridge Pasture SSSI	13.3 km west	9.3 km west
Briarcroft Pasture SSSI	13.3 km west	9.8 km south-west

6.2.33 Statutory designated sites of local importance and non-statutory designated sites identified within 2 km of the Proposed Development Site are presented in Table 2.3.

Priority Habitats

6.2.34 No ancient woodland within the Proposed Development Site was identified by the desk study, however an area of ASNW known as Wilton Wood, part of the Wilton Wood Complex LWS identified in Table 2.3, was identified within 2 km of the Proposed Development Site (see Figure 6.2.2 in Appendix A) (approximately 1.2 km south-east of the Hydrogen Pipeline (east) but over 7 km from the HPF Area).

6.2.35 The desk study also identified Section 41 priority habitats, listed under the NERC Act⁷⁹, within the Indicative Proposed Development Site; comprising coastal saltmarsh, coastal and floodplain grazing marsh, reedbeds, mudflats, and deciduous woodland. In addition to these priority habitats, areas of coastal sand dunes, ponds and saline lagoons were also identified within 2 km of the Proposed Development Site (see Figure 6.2.3 in Appendix A). Refer to Appendix E (Volume II) for further information.

Protected and Notable Species

Notable flora

6.2.36 One hundred and twenty-nine records of protected/ notable floral species within 2 km of the Indicative Proposed Development Site are noted in the last ten years, including carline thistle (*Carlina vulgaris*) which is Near Threatened, wild strawberry (*Fragaria vesca*) which is on the Red List and *Gymnadenia conopsea* agg. which is an Annex B species from The Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)⁸⁵. Refer to Appendix E for more information.

Invasive Non-Native Species

- 6.2.37 Eight records of INNS listed on Schedule 9 of WCA⁷⁷ were noted from the desk study with none located within the Indicative Proposed Development Site. Refer to Appendix E for more information.

Amphibians

- 6.2.38 Over 10,000 records of amphibians within 2 km of the Indicative Proposed Development Site were noted in the last ten years, including common frog (*Rana temporaria*), common toad (*Bufo bufo*), smooth newt (*Lissotriton vulgaris*), and GCN. All amphibians are protected by law in the UK under Schedule 5 of WCA⁷⁷. Common toad and GCN are Species of Principle Importance (SoPI) in England under Section 41 of the NERC Act⁷⁹. GCN are also a species of local importance under the Tees Valley BAP⁸⁹.
- 6.2.39 Three of the statutory designated sites within 15 km and five non-statutory designated sites within 2 km of the Proposed Development Site respectively list amphibian species as a designating feature. Refer to Appendix E for more information.

Badger

- 6.2.40 Three records of badger were returned by the desk study within 2 km of the Indicative Proposed Development Site in the last ten years. Badgers and their setts are protected by law in the UK under the Protection of Badgers Act 1992⁸⁰. Refer to Appendix E for more information.

Bats

- 6.2.41 Twenty-one records of bat species within 2 km of the Indicative Proposed Development Site were returned in the last ten years, including common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), *Myotis* sp., and noctule bat (*Nyctalus noctula*).
- 6.2.42 All bat species and their roosts are protected by law in the UK under Schedule 5 of WCA⁷⁷. Soprano pipistrelle are also a SoPI⁷⁹. All bat species, except common pipistrelle are of local importance⁸⁹. Refer to Appendix E for further information.

Birds

- 6.2.43 Over 110,000 records of birds were recorded in the spring/ summer months (March-August) within 2 km of the Indicative Proposed Development Site in the last ten years, comprising over 180 different species. Of these, 99 are resident/ summer bird species.
- 6.2.44 Almost 140,000 records of birds were recorded in the winter months (October-February) within 2 km of the Indicative Proposed Development Site in the last ten years, comprising over 155 different species. Of these, 106 are resident/ winter bird species.

- 6.2.45 Nine European statutory designated sites within 15 km, two national statutory designated sites within 10 km and two local statutory designated sites within 2 km of the Proposed Development Site (as shown within Table 6.12, Table 6.13, and Table 2.3), respectively list bird species or breeding birds as a designating feature. In addition, five non-statutory designated sites within 2 km (as shown within Table 2.3) respectively list bird species or breeding birds as a designating feature.
- 6.2.46 WeBS data will be sought as part of the EIA to include updated data. Refer to Appendix E for more information.

Terrestrial Invertebrates

- 6.2.47 Over 49,000 notable invertebrate species were recorded within 2 km of the Indicative Proposed Development Site in the last ten years. The review of historical data since 2008, provided by INCA and its associates for the land at and adjacent to the existing CATS Terminal, found no legally protected terrestrial invertebrate species within the past ten years, although many species of conservation significance were identified.
- 6.2.48 Four statutory designated sites and two non-statutory designated sites within 2 km of the Proposed Development Site list invertebrates as a qualifying feature (feature for which the site is designated for). Refer to Appendix E for more information.

Reptiles

- 6.2.49 Forty-three records of reptiles are noted within 2 km of the Indicative Proposed Development Site in the last ten years, including common lizard (*Zootoca vivipara*), an undetermined pond turtle species (*Emydidae* sp.), European pond terrapin (*Emys orbicularis*), red-eared terrapin (*Trachemys scripta elegans*) and an undetermined pond slider species (*Trachemys* sp.). Common lizard are a SoPI⁷⁹ and a species of local importance⁸⁹.
- 6.2.50 Two of the non-statutory designated sites within 2 km of the Indicative Proposed Development Site list reptiles, specifically common lizard as a designating feature. Refer to Appendix E for more information.

Otter

- 6.2.51 Thirteen records of Eurasian otter, ('otter'), within 2 km of the Indicative Proposed Development Site were returned in the last ten years. The closest record was located 1.8 km north-east of the Indicative Proposed Development Site, within Locke Park. Otter are a SoPI⁷⁹. Refer to Appendix E for more information.

Water Vole

- 6.2.52 Seven records of European water vole, ('water vole'), within 2 km of the Indicative Proposed Development Site were returned in the last ten years. Water vole are a SoPI⁷⁹ and a species of local importance⁸⁹.

- 6.2.53 Two statutory designated sites within 5 km and two non-statutory designated sites within 2 km of the Proposed Development Site respectively list water vole as a designating feature. Refer to Appendix E for more information.

Other Terrestrial Mammals

- 6.2.54 Over 430 records of other terrestrial mammal species were returned within 2 km of the Indicative Proposed Development Site in the last ten years, including brown hare (*Lepus europaeus*), Eastern grey squirrel (*Sciurus carolinensis*), Eurasian common shrew (*Sorex araneus*), Eurasian pygmy shrew (*Sorex minutus*), Eurasian water shrew (*Neomys fodiens*), European rabbit (*Oryctolagus cuniculus*), harvest mouse (*Micromys minutus*), roe deer (*Capreolus capreolus*), stoat (*Mustela erminea*), weasel (*Mustela nivalis*) and West European hedgehog (*Erinaceus europaeus*).
- 6.2.55 Brown hare, West European hedgehog and harvest mouse are a SoPI⁷⁹. In addition, brown hare and harvest mouse are species of local importance⁸⁹. Refer to Appendix E for more information.

Future Baseline

- 6.2.56 Changes as a result of climate change, natural succession of habitats, the introduction of new receptors into an area and the continued operation of existing developments can all influence future baseline.
- 6.2.57 In the absence of the Proposed Development, it is predicted that the habitat context and management of the HPF Area would see natural succession of habitats. As no substantive changes in habitat context and condition are predicted, the species value of the HPF Area and adjacent land is likely to remain consistent with the current baseline. Minor changes (upwards or downwards) in the distribution of some species, e.g. nesting birds, terrestrial invertebrates and bats, may occur in line with small-scale changes in habitat structure as a result of ecological succession or other natural processes. Any such changes are likely to be within the range of normal inter-annual variation in the distribution and abundance of species populations. In addition, potentially relevant protected species (e.g. badger) could establish in new locations where they would impose new working constraints, due to a need to assist in compliance with the legislation protecting these species.
- 6.2.58 Water quality is expected to improve due to legislation requirements and interventions such as Nutrient Neutrality Policy and Water Framework Directive (WFD) targets, positively supporting terrestrial and aquatic ecology.
- 6.2.59 In the wider Proposed Development Site (outside of the HPF Area) similar natural succession trends are generally likely to those described above

except where new development schemes have the potential to change the future baseline, where these comprise committed developments and involve site clearance/ disturbance of habitats or other indirect effects depending on the nature of e.g. emissions to air (point source, road traffic, noise etc.). Such changes to future baseline within the Hydrogen Pipeline(s) will be appraised in the ES.

Potential Impacts

- 6.2.60 This section identifies potential impacts at a point in time in relation to the construction, operation and future decommissioning of the Proposed Development.
- 6.2.61 The impacts that occur may be direct, indirect, secondary and/ or cumulative. Impacts may also be temporary or permanent and effects may be both beneficial and adverse. For the purpose of this assessment, potential adverse effects are considered at a high level with the potential for direct, indirect, secondary and/ or cumulative impacts also identified. These effects are then assessed based on their likelihood to be 'significant' in EclA terms. An effect will either be 'not significant' (no ecologically meaningful effect) or 'significant' (an ecologically meaningful effect). To provide consistency in terminology across other sections, the residual effects of the Proposed Development are also translated to EIA significance level on a scale of neutral, minor, moderate and major.

Construction

- 6.2.62 During construction, potential impacts may include:
- temporary adverse impacts on the qualifying features of statutory and non-statutory designated sites;
 - permanent direct and indirect effects on otherwise scarce, notable or irreplaceable habitats such as, but not limited to, ancient and native woodland and wetland habitats;
 - permanent fragmentation of habitat corridors which would otherwise facilitate the safe dispersal of species across the landscape impacted by the Proposed Development;
 - permanent loss of, obstruction, displacement or disturbance to habitat used for breeding, foraging and other life cycle stages by notable and protected species;
 - temporary disturbance to protected and notable species through construction related lighting, noise, or vibration;
 - temporary increased traffic movements associated with construction;

- temporary increased pollution or siltation of watercourses, impacting aquatic ecology including fish and invertebrates;
- temporary increased mortality of faunal species due to construction works (for example, entrapment in excavations);
- temporary spread of INNS into the wild as a result of construction activities; and
- permanent positive effects through the incorporation of mitigation and habitat enhancements. This may include the creation of new habitats, removal of INNS and/or the enhancement of existing habitats to provide additional benefits to protected and notable species.

Operation

6.2.63 During operation, potential impacts may include:

- permanent reduction in habitat condition arising from changes in air or water quality as a result of the Proposed Development;
- permanent ongoing disturbance to habitat used for breeding, foraging and other life cycle stages by notable and protected species through operational activities;
- permanent ongoing disturbance to protected and notable species through operational related lighting, noise, vibration, or pollution;
- permanent spread of INNS (biosecurity) into the wild as a result of operational activities; and
- permanent increased mortality of faunal species due to operational works (for example, increased car movements).

Decommissioning

6.2.64 As decommissioning is likely to occur in the future, there is the potential for new habitats or previously absent protected and notable species (including INNS) to be present.

6.2.65 Therefore, during decommissioning, potential impacts may include:

- permanent loss of, obstruction, displacement or disturbance to habitat used for breeding, foraging and other life cycle stages by notable and protected species;
- temporary additional traffic through decommissioning activities which has the potential to cause degradation to the habitats that support the qualifying features, and disturbance to the qualifying features of statutory and non-statutory designated sites;
- temporary spread of INNS (biosecurity) into the wild as a result of decommissioning activities;

- temporary increased pollution or siltation of watercourses, impacting aquatic ecology including fish and invertebrates;
- temporary increased mortality of faunal species due to decommissioning works (for example, increased car movements);
- temporary disturbance to habitat used for breeding, foraging and other life cycle stages by notable and protected species through decommissioning activities; and
- temporary disturbance to protected and notable species through decommissioning related lighting, noise, vibration, or pollution.

6.2.66 The impacts and effects of decommissioning the Proposed Development infrastructure on biodiversity are anticipated to be similar to those associated with construction. The ES will provide a description of the activities and works (including the anticipated duration) which are likely to be considered during decommissioning and where any LSE have been identified for construction stage activities, the Biodiversity section will consider whether similar LSE could occur during decommissioning. Changes to baseline information that could be happening in the intervening period would be addressed via a commitment to a DEMP, which would be secured via the draft DCO.

Embedded Mitigation

6.2.67 The design and evolution of the Proposed Development is ongoing and as such the mitigation requirements will be detailed within the full EcIA. Adverse impacts on ecological receptors will be avoided through the design of the Proposed Development. Where significant adverse effects cannot be avoided through design, additional mitigation measures will be proposed where reasonably practicable. In relation to protected species, Natural England mitigation licences will be obtained at the appropriate time prior to construction, where advised, and this will be outlined in the Schedule of Licences and Other Consents that is prepared to accompany the Application.

6.2.68 The potential impacts on European designated sites ('Habitats Site(s)') will be assessed within a HRA that will accompany the Application. Stage 1 of the HRA process (test of likely significant effects (ToLSE)) will consider the potential pathways of effect between the Proposed Development and relevant Habitats Sites within 15 km of the Proposed Development Site, and whether there is potential to have an LSE on the integrity of any Habitats Site, either alone or in combination with other plans or projects. Information used to support the HRA process will include desk study data and the results of relevant species surveys undertaken by the Applicant. The HRA will include a nutrient neutrality screening assessment for the Teesmouth and

Cleveland Coast SPA, as set out within Section 6.14: Water Environment.

- 6.2.69 Where there is potential for the Proposed Development to have a LSE upon a Habitats Site, the Proposed Development will be taken forward to Stage 2 – Appropriate Assessment (AA). At AA, mitigation measures will be taken into account to avoid adverse effects on the integrity of any Habitats Site.
- 6.2.70 Habitats of ecological value will be retained where reasonably practicable. Where it is not reasonably practicable to retain valued habitats in situ, habitat loss or severance will be mitigated for (e.g. development of new hedgerows, watercourses, and grassland, etc).
- 6.2.71 Technical work will be undertaken to quantify the change in biodiversity units predicted to arise from the Proposed Development, and to evaluate the BNG that can be achieved via habitat enhancement and creation. Calculations will be prepared using the DEFRA Statutory Biodiversity Metric, and related guidance documents published by Natural England. A BNG uplift of 10% (minimum) in biodiversity units is being targeted, noting that BNG is currently expected to become mandatory for NSIP from late November 2025. The BNG assessment will be presented within an appendix of the Outline LBMEP that accompanies the Application. Where it is not possible to achieve BNG within the Order Limits, off-site opportunities will be sought.
- 6.2.72 Where needed, the Outline LBMEP will outline the approach with respect to pre-construction surveys for protected and notable species and timing of works outside of sensitive seasons (including breeding bird season (March to August inclusive) where breeding bird habitat is present).
- 6.2.73 A Framework CEMP will be submitted with the Application to control impacts on designated sites, habitats and species during the construction of the Proposed Development. The Final CEMP would be prepared in accordance with the Framework CEMP by the appointed contractor and implemented to avoid, minimise or mitigate effects on the environment during the construction of the Proposed Development.

Summary of Potential Likely Significant Effects

- 6.2.74 The impacts which have the potential to give rise to LSE in relation to the Proposed Development include:
- loss, fragmentation, severance and degradation of habitats and designated sites during the construction and operation phase;
 - disturbance to designated sites, habitats and species through noise, vibration, light and dust during the construction phase; and
 - increased noise/ light levels and mortality of species due to the increase in number of vehicle movements within the Proposed Development Site during the construction phase.

- 6.2.75 While it is likely that the above effects would be mitigated through legal compliance, habitat creation, management, monitoring and the implementation of best practice measures, it is considered that there is additional survey and assessment work required to understand the Proposed Development's baseline ecology and LSE, to develop the bespoke mitigation plans proposed, and to then confirm the residual effects and their likely significance. Therefore, the above construction, operation and decommissioning effects listed in paragraph 6.2.62 are **Scoped In**.
- 6.2.76 Table 6.14 summarises the potential construction, operational and decommissioning impacts relevant to the biodiversity assessment proposed to be **Scoped In** or **Scoped Out** of EIA.

Table 6.14: Biodiversity elements scoped in or out of future environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline(s)				
Designated Sites				
Statutory Designated Sites within 15 km of the Proposed Development.	Construction / Operation / Decommissioning	✓		Activities could potentially result in direct loss, fragmentation and degradation of statutory designated sites located within 15 km of the Proposed Development Site.
Non statutory designated sites within 2 km of the Proposed Development Site	Construction / Operation / Decommissioning	✓		Activities could potentially result in direct loss and fragmentation of non-statutory designated sites located within 2 km of the Proposed Development Site.
Habitats				
Section 41 priority habitats: reedbeds, lowland calcareous, native hedgerow, wet woodland, coastal sand dunes, lowland fens, coastal saltmarsh, intertidal mudflats and sandflats eutrophic standing waters, and OMH.	Construction / Operation / Decommissioning	✓		Additional surveys will be completed to confirm their presence or absence within the Proposed Development Site.

Element	Phase	Scoped In	Scoped Out	Justification
Habitats located within the Proposed Development Site	Construction / Operation / Decommissioning	✓		Additional surveys will be completed to characterise and assess the condition of the habitats located within the Proposed Development Site.
Species				
Amphibians (including GCN)	Construction / Decommissioning / Operation	✓		Additional surveys will be completed to evaluate their presence or absence within the Proposed Development Site.
Badger	Construction / Operation / Decommissioning	✓		As above.
Bats (roosting, foraging and commuting)	Construction / Operation / Decommissioning	✓		As above.
Breeding birds	Construction / Operation / Decommissioning	✓		As above.
Wintering Birds	Construction / Operation / Decommissioning	✓		As above.
Reptiles	Construction / Operation / Decommissioning		✓	From previous surveys of the Indicative Proposed Development Site, additional local surveys and lack of connectivity between the returned records and the Proposed Development, reptiles are assumed absent.
Terrestrial Invertebrates	Construction / Operation / Decommissioning	✓		As above.
Otter	Construction / Operation / Decommissioning	✓		As above.
Water vole	Construction / Operation / Decommissioning	✓		As above.

Proposed Assessment Methodology

Ecological Field Survey Methodology

- 6.2.77 A suite of ecological surveys will be completed within the Proposed Development Site to assess the potential presence of protected and notable habitats and species. These surveys will be focussed upon important ecological features and will take place within the Zol of each of these features in the context of the Proposed Development.

Habitat Surveys

- 6.2.78 UK Habitat Classification (UKHab) surveys, Habitat Condition Assessments and INNS surveys of the Proposed Development are to be undertaken during optimum times of year for botanical surveys (April to September), in accordance with Natural England best practice.
- 6.2.79 These surveys and assessments will cover areas within the Proposed Development boundary that have not been previously surveyed, due to recent changes in the boundary, or where current habitat data is likely to become invalid according to CIEEM guidance⁹⁸ to provide representative baseline data for assessing the potential impact on habitats.
- 6.2.80 Survey areas will include land at the existing CATS Terminal for the HPF Area, Saltholme Power Station, Seal Sands emergency access road and adjacent mudflats, Seaton Carew Road as well as OMH on previously developed land across Seal Sands and adjacent to the Dabholm Gut.
- 6.2.81 Habitats will be categorised in accordance with the UKHab definitions⁹⁹. Habitat classifications are based principally on vegetation, and the survey allows for the location, extent, and distribution of these habitats to be recorded. The condition of habitats will be assessed against the perceived 'ecological optimum' for their relevant habitat type using habitat condition assessments¹⁰⁰.
- 6.2.82 As part of the field survey, INNS will be identified, and habitats will be assessed for their potential to support protected or notable species in accordance with the CIEEM PEA guidelines⁹². INNS are defined as any non-native plant introduced outside its natural past or present distribution which can cause damage to the environment. All flora listed within Schedule 9 of

⁹⁸ The Chartered Institute of Ecology and Environmental Management (2019) Advice note on the Lifespan of Ecological Reports and Surveys. Available at: <https://cieem.net/resource/advice-note-on-the-lifespan-of-ecological-reports-and-surveys/> [Accessed 24/01/2025].

⁹⁹ UKHab (2023) The UK Habitat Classification Version 2.0. Available at: <https://www.ukhab.org.uk> [Accessed 24/01/2025].

¹⁰⁰ UK Government (2024) Statutory biodiversity metric tools and guides – Statutory biodiversity metric condition assessment. Available at: <https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides> [24/01/2025].

WCA⁷⁷ are considered INNS.

Protected Species Surveys

- 6.2.83 Following the results of the desk study, UKHab surveys, and species surveys completed in 2022, 2023 and 2024, further dedicated species surveys will be undertaken.
- 6.2.84 The scope of these surveys will be determined following refinement of the Proposed Development design and consultation with Natural England. The following sections describe the anticipated survey scope. Good practice methodology, survey timings and the likely ZOI have been detailed where relevant. Survey methodologies for each species **Scoped In** for assessment will be produced and described within the EcIA.

Amphibians

- 6.2.85 Twenty-nine waterbodies suitable for amphibians were identified within 250 m of the Indicative Proposed Development Site. Terrestrial connectivity was provided between the ponds and the Proposed Development Site, comprising hedgerows, woodland, scrub and grassland habitats.
- 6.2.86 HSI assessments of areas of standing water within the Indicative Proposed Development Site and suitable waterbodies within 250 m of the Indicative Proposed Development Site, which are not separated by barriers such as roads and watercourses, were completed in 2023 and 2024 to evaluate their suitability for GCN. The HSI can be undertaken at any time of year. Waterbodies assessed as being good or excellent are more likely to be occupied by GCN and therefore further survey work would be considered to evaluate their presence or likely absence.
- 6.2.87 eDNA sampling to indicate the presence/ likely absence of GCN was undertaken for those waterbodies assessed as being good or excellent by the HSI, where water levels were sufficient. The eDNA sampling involved taking a water sample from each waterbody and sending it to a laboratory to be tested for the presence of GCN DNA. The eDNA must be undertaken from Mid-April to the end of June, exclusively. One waterbody, located within Cowpen Bewley Woodland Park, returned with DNA evidence of GCN, indicating their presence.
- 6.2.88 GCN population estimate surveys could therefore be undertaken to evaluate the size of the GCN population within habitats suitable for GCN, such as standing open water, which is likely to be impacted by the Proposed Development. GCN population surveys may be undertaken between April and September, comprising four visits using a range of methods such as funnel/ bottle trapping, netting, egg searches of submerged aquatic vegetation and nocturnal torch surveys.

Badger

- 6.2.89 No prior badger surveys have been completed within 100 m of the Proposed Development Site. Badger surveys will be undertaken within 100 m of the Proposed Development Site where historical records of badger have been identified from the past ten years, specifically for relevant woodland habitats.
- 6.2.90 Badger surveys will identify locations and classification of badger setts where suitable habitat and/ or badger field signs have been identified. Where there is the potential for significant severance/ fragmentation of territories, an understanding of territory use through survey as defined in the scope, including use of bait marking studies, may be advised. These surveys will be undertaken in line with best practice methodology by Harris et al (1989)¹⁰¹.
- 6.2.91 Badger surveys to identify field signs (setts, hairs, latrine, footprints etc) will ideally be undertaken in early spring or autumn/ winter when vegetation is at its lowest.

Bats

- 6.2.92 Bat surveys will be undertaken within the Proposed Development Site where existing field data is likely to become invalid according to CIEEM guidance⁹⁸ to provide representative baseline data for assessing the potential impact on this protected species.
- 6.2.93 Bat surveys will be undertaken in line with best practice guidelines as set out by the Bat Conservation Trust¹⁰² and will comprise manual and automated/ static bat activity surveys for commuting and foraging bats, and PRF assessments of structures and trees for roosting bats. Survey areas include woodland, scrub and grassland habitats at the existing CATS Terminal for the HPF Area and within the construction corridor for the Hydrogen Pipeline(s), where potential permanent and/ or temporary loss of habitat is likely to occur.
- 6.2.94 Manual bat activity surveys entail transect, and vantage point (VP) surveys of a study area using bat detectors to observe and record bat behaviour during the evening and night. Automated/ static bat activity surveys deploy bat detectors at fixed locations to record bat activity remotely to establish species richness, relative abundance and importance of landscape features. The extent of bat detector deployment is dependent upon the suitability of the habitat features. Bat activity surveys may ideally be undertaken between May and August (inclusive).

¹⁰¹ Harris S., Cresswell P., Jefferies D. (1989) Surveying Badgers, The Mammal Society. Available at: <https://cieem.net/resource/surveying-badgers-the-mammal-society/> [Accessed 24/01/2025].

¹⁰² Bat Conservation Trust (2023) Bat Surveys for Professional Ecologist: Good Practice Guidelines 4th edition. Available at: <https://www.bats.org.uk/resources/guidance-for-professionals/bat-surveys-for-professional-ecologists-good-practice-guidelines-4th-edition> [Accessed 24/01/2025].

- 6.2.95 PRF assessments for trees and structures, also known as PRA and ground level tree assessments (GLTA), record the potential suitability of structures and trees for hibernation roost sites. These surveys will be undertaken up to 100 m from the HPF Area and Hydrogen Pipeline(s) and can be undertaken year-round.
- 6.2.96 If further surveys are advised to evaluate if a bat roost is present, dusk emergence and dawn re-entry surveys will be undertaken. In line with best practice guidelines, these surveys may ideally be completed from May to September (inclusive) and spread throughout this season in order to capture different roost types (if present).
- 6.2.97 If a structure or tree is identified as being suitable for hibernating bats, bat hibernation surveys will be undertaken in January, February or December 2025.

Birds – Breeding

- 6.2.98 Further breeding bird surveys will be undertaken for areas within the Proposed Development Site that have not been previously surveyed, due to recent changes in the indicative Proposed Development Site boundary, or where current breeding bird data is likely to become invalid according to CIEEM guidance⁹⁸ to provide representative baseline data for assessing the potential impact on this protected species.
- 6.2.99 Survey areas include scrub, wetland and open grassland habitats adjacent to the Teesmouth Estuary, existing CATS Terminal for the HPF and along the construction corridor for the Hydrogen Pipeline, where permanent and/or temporary loss of breeding bird habitat is likely to occur.
- 6.2.100 Field survey methods would be based on the BTO Common Bird Census (CBC)¹⁰³ with up to six site visits being undertaken across the breeding bird season (April to August), in accordance with the current Bird Survey Guidelines¹⁰⁴. The surveyors would follow a transect route which would provide access to all of the habitats present within the survey area. Transects would be walked slowly on each of the visits, with the starting point and direction of travel reversed on alternate visits to avoid potential temporal bias.
- 6.2.101 Following the completion of the breeding bird survey, territory analysis and mapping will be undertaken, which can be used to assess the value of the Proposed Development for breeding bird species in terms of diversity and distribution across the site and highlight any important habitats and known nest sites for breeding birds.

¹⁰³ Marchant, J.H. (1983) Common Birds Census Instructions. Tring: British Trust for Ornithology.

¹⁰⁴ Bird Survey & Assessment Steering Group (2024) Bird Survey Guidelines for assessing ecological impacts. Available at: <https://birdsurveyguidelines.org> [Accessed 24/01/2025].

- 6.2.102 Where required to inform a robust assessment, further specific surveys will be undertaken for protected and/ or notable species such as barn owl, a species listed under Schedule 1 WCA⁷⁷, in accordance with relevant survey guidelines¹⁰⁵. The requirement for such species-specific surveys will be determined following the review of the completed 2024 UKHab and breeding bird surveys.

Birds - Wintering

- 6.2.103 Further wintering bird surveys are being undertaken on a monthly basis from October 2024 to March 2025 for areas within the Proposed Development Site that have not been previously surveyed, due to recent changes in the indicative boundary, or where current wintering bird data is likely to become invalid according to CIEEM guidance⁹⁸ to provide representative baseline data for assessing the potential impact on this protected species.
- 6.2.104 Survey areas include the Greatham Creek confluence, open mud, wetland, shallow water and grassland habitats within proximity to the Teesmouth and Cleveland Coast SPA and SSSI, the HPF and along the construction corridor for the Hydrogen Pipeline(s), where permanent and temporary loss of wintering bird habitat is likely to occur.
- 6.2.105 Field survey methods are based on the WeBS¹⁰⁶ methodology, consisting of a transect surveys with predefined VP across pre-determined survey areas. A VP will be chosen in an area where the surveyor has an unrestricted view over a survey area with a scanning arc of 180°, in order to avoid loss of sight of the bird. The VP will be no more than 2 km away from the survey area to make a reasonable effort to achieve maximum visibility, reliable observations, and minimal disturbance to the target species. Where survey sites are over a large area, and with areas of reduced visibility due to topography or landscape features, additional VPs will be used to provide representative coverage of a survey area. Surveyors will also undertake transects of suitable habitat. Surveyors will walk the suitable habitat and record the location of birds seen or heard.
- 6.2.106 For both the VP surveys and transects, species present in a relatively small number will be counted individually. Birds present in a large flock will be estimated by mentally dividing the birds into smaller groups and counting the number of groups. Appropriate annotated field maps will be provided to show the bird species, height band, flight line and direction; the standard two letter BTO species and activity codes will be used on all surveys. Generic wintering bird monitoring methods given in Bird Monitoring

¹⁰⁵ Shawyer, C. R. (2011) Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting. IEEM, Winchester.

¹⁰⁶ Bibby, C.J., Burgess, N.D., Hill, D.A., & Mustoe, S.H. (2000) Bird Census Techniques. 2nd edition. Academic Press, London.

Methods¹⁰⁷ and Bird Census Techniques¹⁰⁶ will also be referred to.

- 6.2.107 These surveys would provide data which can be used to assess the value of the Proposed Development Site for wintering bird species, in terms of diversity and distribution, across the site and highlight important habitats for wintering birds at the Proposed Development Site.

Reptiles

- 6.2.108 Reptile surveys were completed in 2022 and 2023 across habitats of potential importance including OMH, scrub and calcareous grassland. The surveys were completed in line with best practice guidance from Joint Nature Conservation Committee (JNCC)¹⁰⁸, the Amphibian and Reptile Conservation Trust¹⁰⁹ and Froglife¹¹⁰. No field signs of reptiles were recorded.
- 6.2.109 From discussions with INCA who have completed a significant amount of ecological survey work within the Teesside area, the closest known population of reptiles are located approximately 1.5 km north of the Proposed Development Site. There is limited connectivity between this location and the Proposed Development Site, due to the presence of residential dwellings, industrial development and marine habitats.
- 6.2.110 The presence of reptiles within the Proposed Development is therefore considered unlikely. After a review of the latest Proposed Development Site and the validity of reptile survey data, in accordance with CIEEM guidance⁹⁸, further surveys will therefore are **Scoped Out**.
- 6.2.111 The LPA and Natural England will be consulted via the EIA Scoping Opinion, and subsequent technical engagement, to confirm that the completed survey effort is sufficient to conclude the absence of reptiles as a relevant ecological feature within the Proposed Development Site.

Terrestrial Invertebrates

- 6.2.112 Further invertebrate surveys will be undertaken in line with good practice guidance as provided by Natural England¹¹¹ and CIEEM¹¹² for areas within the Proposed Development Site that were impacted by weather and access constraints in 2024 or where current invertebrate data is likely to become invalid according to CIEEM guidance⁹⁸. This is to provide representative

¹⁰⁷ Gilbert, G., Gibbons, D.W. & Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy.

¹⁰⁸ Gent, T., Gibson, S. (2003) Joint Nature Conservation Committee, Herpetofauna Workers Manual.

¹⁰⁹ Edgar, P., Foster, J., Baker, J. (2010) Reptile Habitat Management Handbook.

¹¹⁰ Froglife (1999) Froglife Advice Sheet 10: Reptile Survey. Available at: https://www.wildcare.co.uk/media/wysiwyg/pdfs/froglife_advice_sheet_10_-_reptile_surveys.pdf [Accessed 24/01/2025].

¹¹¹ Drake, C.M., Lott, D.A., Alexander, K.N.A. & Webb, J.R (2007) Natural England Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation, Natural England Research Report, NERR005.

¹¹² Jukes, A. (2021) Considering Invertebrates in Preliminary Ecological Appraisals, In Practice. 40-45, Issue 111.

baseline data is collected for assessing the potential impact on protected and notable invertebrates and important assemblages of terrestrial invertebrates.

- 6.2.113 Survey areas include OMH, scrub, grassland and reedbed habitats at the existing CATS Terminal for the HPF and at Wilton International complex along the Hydrogen Pipeline, where permanent and temporary loss of invertebrate habitat is likely to occur.
- 6.2.114 Terrestrial invertebrate survey methodology selected will be dependent on the taxa and habitats under consideration. Habitats identified to be of actual or potential importance within the Proposed Development include OMH, scrub, calcareous grassland and reedbed. Natural England¹¹³ provides details of standard methodologies, and the selection of appropriate methods in terms of habitats and taxa. The methods adopted will follow this guidance wherever possible.
- 6.2.115 Surveys will be undertaken within the Proposed Development Site, with the number and timing of site visits dependent on the habitats to be surveyed and the taxa under consideration.

Otter and Water vole

- 6.2.116 Further otter and water vole surveys will be undertaken in tandem for riparian habitats (i.e. watercourses and waterbodies) within 100 m of the Hydrogen Pipeline between Cowpen Bewley Woodland Park and the HPF Area to provide representative baseline data for assessing the potential impact on these protected species.
- 6.2.117 Survey areas have been identified as areas of likely importance for otter and water vole from the desk study and prior field survey results. These areas include the riparian habitats associated with Belasis Beck, ditches along the northern boundary of RSPB Saltholme and the Dabholm Gut (otter only). Surveys will involve walkovers along watercourses and waterbodies to identify locations of otter and water vole field signs as well as to assess their overall habitat suitability. Surveys will be undertaken in line with guidance as set out in the Water Vole Conservation Handbook (2011)¹¹⁴, the Water Vole Mitigation Handbook (2016)¹¹⁵ and the Otter Field Survey and Monitoring Handbook¹¹⁶. Otter and water vole surveys can be undertaken

¹¹³ Natural England (2023) Invertebrates: advice for making planning decisions. Available at: <https://www.gov.uk/guidance/invertebrates-advice-for-making-planning-decisions> [Accessed 24/01/2025].

¹¹⁴ Rob Strachan, Tom Moorhouse and Merryl Gelling (2011) Water Vole Conservation Handbook. Wild Conservation Research Unit, University of Oxford

¹¹⁵ Mike Dean, Rob Strachan, Derek Gow, Richard Andrews, Fiona Matthews, Paul RF Chanin (2016) The Water Vole Mitigation Handbook. Mammal Society.

¹¹⁶ Findlay, M.A. & White, P.J.C (2025) The Otter Field Survey and Monitoring Handbook: A Practical Guide to Field and Camera-Trap Surveys. Pelagic Publishing.

from April to September, ideally at least two visits comprising one in early spring (April to May) and one in mid-summer (July to August).

Ecological Impact Assessment

- 6.2.118 The EclA, in accordance with good practice guidance issued by CIEEM⁹¹, will focus on those ecological features that are ‘relevant’ as it is not advised in the assessment to address all ecological features with potential to occur.

Receptors

- 6.2.119 The key ecological receptors to be included within the biodiversity section of the ES are:
- international statutory designated sites, including, SPA, SAC and Ramsar Sites within a 15 km Zol of the Proposed Development Site;
 - national statutory designated sites, including SSSI within a 15km Zol for the Proposed Development Site;
 - national statutory designated sites, including, NNR and LNR within a 2 km Zol of the Proposed Development Site;
 - non-statutory designated sites, including LWS within 2 km Zol of the Proposed Development Site; and
 - other relevant data, e.g. priority and notable habitats within 2 km Zol, and Ancient Woodland Inventory within 500 m Zol of the Proposed Development Site.
 - habitats within Site comprising cropland, lowland calcareous grassland, grassland, heathland and shrub, urban habitats (including OMH), woodland, intertidal sediment, coastal lagoons, wetlands, individual trees, lakes, sparsely vegetated land and watercourses; and
 - protected and notable species including amphibians, bats, breeding and wintering birds, GCN, terrestrial invertebrates, badger and riparian mammals.

Impacts and Effects

- 6.2.120 The EclA will be in line with the good practice guidance as set out by CIEEM⁹¹. The impact assessment process involves:
- identifying and characterising impacts (from construction, operation, and decommissioning, including cumulative impacts and effects);
 - incorporating measures to avoid and mitigate (reduce) these impacts;
 - assessing the significance of any residual effects after mitigation;
 - identifying appropriate compensation measures to offset significant residual effects; and
 - identifying opportunities for ecological enhancement.

- 6.2.121 Based on the EclA best practice guidelines, the following definitions will be used when characterising the ecological impacts during all stages of the Proposed Development:
- **Positive or Negative:** Positive is a change that improves the quality of the environment, whereas negative reduces the quality of the environment.
 - **Extent:** The spatial or geographical area over which the positive or negative impact/effect occurs such as local, regional, national etc.
 - **Magnitude:** The intensity, size and/or volume of the impact/effect that may occur. This may include a discussion on the amount of habitat lost or the decline in a species population.
 - **Duration:** This would be defined as the length of time over which the impact/effect may occur, such as the lifecycle of a species or for the duration of the construction period.
 - **Frequency and timing:** The number of times an activity may occur and how this will influence the impact/effect. The timing of the activity and how this may result in an impact such as during the breeding bird season or night-time working.
 - **Reversibility:** This may include irreversible effects where recovery of a habitat or a population is not possible (such as loss of ancient woodland), or where recovery may be counteracted by mitigation.
- 6.2.122 The importance of each receptor will be considered within a defined geographical context. The ecological resources and features present at the Proposed Development are assigned values within this section using a geographical scale of reference, according principally to their biodiversity value, plus any social, community or economic value that can be attributed to them, as well as their legal protection status.
- 6.2.123 Evaluation is based on both the baseline data established by survey and consultation, and the context of the records against the established criteria, appropriate policies and guidance. Furthermore, professional judgement is used, based on available information on that resource or feature, such as local distribution and status, wider population trends and expert advice.

Table 6.15 Geographical scale of reference for ecological receptors

Designation	Receptors
International	Statutory internationally designated sites identified through international conventions and European directives such as SPA, SAC, and Ramsar sites. Site supporting an internationally important population of a species or species assemblage.
National	Statutory nationally designated site such as SSSI and NNR. Sites supporting a nationally important population of a species or species assemblage.
Regional	Statutory designated LNR. Non-statutory designated sites identified in local plans such as SINC. Sites supporting a population of a species or species assemblage important in a regional context.
County	Non-statutory designated sites given lower than regional importance for nature conservation. Sites supporting a population of a species or species assemblage important in a county context.
Borough/District	Non-statutory designated sites given lower than county importance for nature conservation. Sites supporting a population of a species or species assemblage important in a borough/ district context.
Local/Neighbourhood	Sites that have no formal designation but contain species or habitats that are important to the ecological integrity of the local area. Various approaches can be adopted for defining local importance, including assessment within a district or borough context or within a Zol.

Assumptions, Limitations and Uncertainties

- 6.2.124 There is limited design information available at the time of writing the EIA Scoping Report. The assessment within the ES will be in-line with the latest available design information at the time of submission. Where design information is unknown or unavailable, worst-case assumptions will be made.
- 6.2.125 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Therefore, the absence of evidence of any specific species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, professional judgement allows for the likely presence of these species to be predicted with enough certainty to not significantly limit the validity of these findings.

6.3 Climate Change and Resilience

Overview

- 6.3.1 This section sets out the proposed scope and methodology for the climate change resilience (CCR) assessment of the Proposed Development including:
- CCR assessment – to identify what climate changes are forecast to occur in the future, and the vulnerability of the Proposed Development to those forecast changes in climate; and
 - In-combination climate change impact (ICCI) assessment – to identify where a changing climate will combine with environmental impacts arising from the Proposed Development, resulting in LSE on environmental receptors within the scope of the EIA which are not present under current climate conditions.
- 6.3.2 This section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report. Climate resilience policy is intrinsically linked with GHG emissions policy; therefore, this section should be read in conjunction with Section 6.5: Greenhouse Gases.

Legislation, Policy and Guidance Context

- 6.3.3 The methodology for the CCR and ICCI assessments has been developed in line with relevant legislation, policy, and industry guidance. The following legislation, policy and guidance will be considered in the ES:
- The Infrastructure Planning (Environmental Impact Assessment) Regulations (2017)¹;
 - The Climate Change Act (2008)¹¹⁷;
 - The Overarching NPS for Energy (EN-1) (2023)²⁶;
 - The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2023)³²;
 - The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
 - The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
 - The NPPF (2024)²⁷;
 - The UK Climate Change Risk Assessment (CCRA) (2021)¹¹⁸;

¹¹⁷ UK Government (2008) The Climate Change Act 2008.

¹¹⁸ Betts, R.A. and Brown, K. (2021) Introduction. In: The Third UK Climate Change Risk Assessment Technical Report. Available at: <https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA3-Technical-Report-Introduction-FINAL.pdf> [Accessed 24/01/2025].

- The latest National Adaptation Plan (2023)¹¹⁹;
- UK Government Climate Change Guidance (2019)¹²⁰;
- Designing for Infrastructure Resilience (2016)¹²¹;
- Flood risk assessments: climate change allowances, Environment Agency (2022)¹²²;
- Tees Valley Climate Change Strategy (2020)¹²³;
- Tees Valley Green Infrastructure Strategy (2008)¹²⁴;
- Tees Valley Net Zero Strategy (2023)¹²⁵;
- SBC Environmental Sustainability & Carbon Reduction Strategy 2022-2032 (2022)¹²⁶; and
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (2020)¹²⁷.

Consultation

6.3.4 There is no statutory stakeholder for climate matters and therefore no formal consultation has been undertaken to date. It is anticipated that the EIA Scoping Opinion from PINS will provide the agreed basis for the assessment

¹¹⁹ Department for the Environment, Food and Rural Affairs (2023) The Third National Adaptation Programme (NAP3) and the Fourth Strategy for Climate Adaptation. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1172931/The_Third_National_Adaptation_Programme.pdf [Accessed 24/01/2025].

¹²⁰ Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019) Climate change guidance. Available at: <https://www.gov.uk/guidance/climate-change> [Accessed 24/01/2025].

¹²¹ Department for International Development (2016) Designing for Infrastructure Resilience. Available at: https://assets.publishing.service.gov.uk/media/57d6bc5be5274a34fb00002e/Designing_for_Infrastructure_Resilience_July_2016_external.pdf [Accessed 24/01/2025].

¹²² Environment Agency (2022) Flood risk assessments: climate change allowances. Available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> [Accessed 24/01/2025].

¹²³ Tees Valley Unlimited (2010) Tees Valley Climate Strategy 2010 – 2020. Available at: <https://beta.darlington.gov.uk/media/1537/tees-valley-climate-change-strategy.pdf> [Accessed 24/01/2025].

¹²⁴ Tees Valley Joint Strategy Unit (2008) Tees Valley Green Infrastructure Strategy. Available at: <https://teesvalleynaturepartnership.org.uk/wp-content/uploads/2013/11/Tees-Valley-Green-Infrastructure-Strategy.pdf> [Accessed 24/01/2025].

¹²⁵ Tees Valley Combined Authority (2023) Net Zero Strategy for Tees Valley. Available at: <https://teesvalley-ca.gov.uk/business/wp-content/uploads/sites/3/2023/03/Net-Zero-strategy-Digital.pdf> [Accessed 24/01/2025].

¹²⁶ Stockton-on-Tees Borough Council (2022) Environmental Sustainability & Carbon Reduction Strategy 2022-2032. Available at: [https://moderngov.stockton.gov.uk/Data/Cabinet/202203171630/Agenda/\\$att42380.docx.pdf](https://moderngov.stockton.gov.uk/Data/Cabinet/202203171630/Agenda/$att42380.docx.pdf) [Accessed 24/01/2025].

¹²⁷ Institute of Environmental Management and Assessment (2020) EIA Guide to: Climate Change Resilience and Adaptation. Available at: <https://www.iema.net/media/mabhqino/iema-eia-climate-change-resilience-june-2020.pdf> [Accessed 24/01/2025].

presented in the ES. Comments received will be considered and addressed through the EIA process, including where relevant to the CCR and ICCI assessment. Local authorities will be contacted if additional matters are raised in the EIA Scoping Opinion.

Baseline Conditions and Receptors

study area

- 6.3.5 The study area for the CCR and ICCI assessments includes all land identified as potentially needed to construct and operate the Proposed Development (i.e. the Proposed Development Site) and surrounding areas that may impact the Proposed Development Site (e.g. River Tees).
- 6.3.6 The CCR assessment considers potentially significant climate hazards for infrastructure and assets associated with the Proposed Development over its expected 25-year operational life for each train. It is noted that there is potential for an extended operating life beyond 25 years.
- 6.3.7 The ICCI assessment will consider receptors associated with each environmental discipline, as identified in each topic chapter (refer to Section 8: Summary, Table 8.2).

Baseline Conditions and Receptors

Existing Baseline

- 6.3.8 Information regarding historical climate conditions for the Proposed Development Site were obtained from the HadUK observation data¹²⁸; this included various climate metrics which mirror projection data to provide context for the future baseline. Historical climate conditions are provided within the 'observed baseline' column of Table 6.16 and Table 6.17 below.

Future Baseline

- 6.3.9 Table 6.16 contains both:
- historical baseline information; and
 - future climate change projections and associated climate hazards, established using projected climate data from the UK Climate Projections 2019 (UKCP18)¹²⁹ projections.

¹²⁸ Met Office; Hollis, D.; McCarthy, M.; Kendon, M.; Legg, T.; Simpson, I. (2018) HadUK-Grid gridded and regional average climate observations for the UK. Available at: <https://catalogue.ceda.ac.uk/uuid/4dc8450d889a491ebb20e724debe2dfb/> [Accessed 24/01/2025].

¹²⁹ Met Office Hadley Centre (2018) UKCP18 Regional Projections at 12km Resolution for 1980-2080. Available at: <https://catalogue.ceda.ac.uk/uuid/8c6c0ae2c25947168826a70d2241b797/> [Accessed 24/01/2025].

6.3.10 Data¹³⁰ is presented for multiple meteorological metrics representing average weather conditions for three different probability levels within the representative concentration pathways (RCP) 8.5 high emissions scenario for the 2050-2080 period.

Table 6.16: UKCP18 Climate Change Probabilistic Projections for average weather metrics for the local area for 2050-2080 (under the RCP8.5 high emissions scenario).

Parameter	Metric	Observed baseline (1980-2010 ¹³¹)	Future baseline climate (2050-2080)		
			Min (10th percentile)	Mean (50th percentile)	Max (90th percentile)
Temperature	Mean winter temperature (°C)	+4.48°C	+6.31°C	+7.11°C	+7.58°C
	Winter mean daily minimum temperature (°C)	+1.65°C	+3.66°C	+4.47°C	+4.89°C
	Mean summer temperature (°C)	+15.08°C	+18.29°C	+19.05°C	+19.32°C
	Summer mean daily maximum temperature (°C)	+19.21°C	+22.89°C	+23.64°C	+24.14°C
Precipitation	Observations: average mm per day during winter months Projections: Change in Winter average daily precipitation (%)	1.64 mm	-10%	+5%	+19%
	Observations: average mm per day during summer months (mm) Projections: Change in Summer average daily	1.99 mm	-31%	-22%	-15%

¹³⁰ Collected from a single 12 km grid cell for the Proposed Development Site.

¹³¹ Baseline year for sea level is 1981-2000.

Parameter	Metric	Observed baseline (1980-2010 ¹³¹)	Future baseline climate (2050-2080)		
			Min (10th percentile)	Mean (50th percentile)	Max (90th percentile)
	precipitation (%)				
Sea level rise	Projections: Sea level rise in m above 1981-2000 average (mean rise 2050-2080) ¹³²		+0.27 m	+0.37 m	+0.49 m

6.3.11 Table 6.17¹³³ contains both the baseline information and climate change projection data for multiple meteorological metrics representing extreme weather conditions for three different probability levels within the RCP8.5 high emissions scenario for the 2050-2080 period.

Table 6.17: UKCP18 climate change local projections for extreme weather events for the local area for 2050-2080 (under the RCP8.5 high emissions scenario).

Parameter	Metric	Observed baseline (1980-2010)	Future baseline climate 2050-2080		
			Min (10th percentile)	Mean (50th percentile)	Max (90th percentile)
Temperature	Number of frost days per year (daily minimum temperature equal to or lower than 0°C)	35.90	0	0.37	13.19
	Number of hot days per year (daily maximum temperature higher than 25°C).	4.40	19.66	28.55	33.99
Precipitation	Annual number of days per year when precipitation is	2.93	2.07	2.48	3.13

¹³² Baseline data not provided for sea level rise – projections are an anomaly above current sea level. Data obtained from UKCP 18 data for grid square, the centre of which is location 54.61, -1.08.

¹³³ Collected from a single 12 km grid cell for the Proposed Development Site

Parameter	Metric	Observed baseline (1980-2010)	Future baseline climate 2050-2080		
			Min (10th percentile)	Mean (50th percentile)	Max (90th percentile)
	greater than 25mm per day (representative of 'heavy rain').				

6.3.12 Overall, the projections indicate that the following future climate hazards are potentially applicable to the Proposed Development:

- warmer winters: Table 6.16 and Table 6.17 show both the winter average and average minimum temperatures are projected to increase. They also suggest that by the latter end of the Proposed Development's lifetime, in an average year, frost days per year may reduce to <1 per year under the 50th percentile of RCP8.5;
- wetter winters and drier summers: Table 6.16 and Table 6.17 suggests that seasonal precipitation will shift, with an average reduction in summer precipitation of 21.8% and an increase in winter precipitation of 5.3%. The decrease in summer precipitation may result in increased drought;
- decreased heavy rainfall: The data suggests the number of heavy rainfall events per year will decrease slightly in the 10th and 50th percentile, with a slight increase in the 90th percentile. Although this does not look to be a significant change in this location, the decreases in summer precipitation generally and more/ longer dry spells in the summer can make the ground harder, meaning high intensity rainfall events are less easily absorbed, further increasing flood risk when heavy downpours occur after dry periods in the summer months; and
- hotter summers and increases in extreme heat: Both average summer temperatures and number of days above 25°C (the regional threshold used by the Met Office for heatwaves¹³⁴) are expected to increase, indicating that summer months will be hotter with a greater number of hot days.

Potential Impacts

6.3.13 This section identifies potential impacts in relation to anticipated changes to climate during construction and operation of the Proposed Development. The CCR assessment considers climate change related risk to the Proposed Development and its operation. The ICCI assessment will consider the climate change impact to environmental receptors identified through the wider environmental assessment covered within the topic

¹³⁴ Met Office (n.d) What is a heatwave? Available at: <https://www.metoffice.gov.uk/weather/learn-about/weather/types-of-weather/temperature/heatwave> [Accessed 24/01/2025].

chapters.

Construction

- 6.3.14 Climate change is not expected to be so significant within the construction programme timescales as to require additional mitigation beyond current best practice. The timescale currently anticipated for construction are outlined in paragraph 3.4.1. It is anticipated that current environment, health and safety regimes during the construction phase will provide appropriate levels of mitigation for changes in climate during the construction period. It is therefore proposed to **Scope Out** the construction phase of the CCR and ICCI assessments.

Operation

- 6.3.15 As per paragraph 3.8.1, each train of the HPF is expected to have a design lifespan of approximately 25 years. The operational life of each train may extend beyond this depending on market conditions and the condition of plant and equipment. The operational phase is proposed to be **Scoped In** to the assessment. From the anticipated changes to the UK climate presented in the section above on Baseline Conditions and Receptors, the resultant hazards identified as relevant to the Proposed Development are presented in Table 6.18 along with the possible impacts on operation which would be further considered in the ES.

Table 6.18: Summary of climate hazards and potential impacts on the Proposed Development during operation.

Climate hazard	Impact on operation
Increased likelihood of extreme hot weather.	Extreme high temperature causing asset failure and or decrease in lifespan. Electronic and communication equipment particularly at risk. Health impacts on workforce from extreme heat.
Intense rainfall events following dry spells/dry summers despite slight reduction in intense rainfall.	Surface flooding on-site or at key access points. Fluvial flooding causing access disruption. Cascading impacts from disruptions caused by flooding in the supply chain and other systems on which the Proposed Development relies.
Possible future increase in drought events – caused by changes to seasonal rainfall (less rain in summer) and increase in dry periods, combined with increasing hot weather events.	Possible water restrictions which could halt or slow down processes, particularly water intensive processes.
Storms/ high winds/ lightning.	Direct damage to assets from high winds. Indirect damage to assets from high winds e.g., debris blown into assets.

Climate hazard	Impact on operation
	Lightning strikes causing asset damage and obstruction to access. Damage or blocking of access routes. Cascading impacts from disruption to supply chain and other systems on which the Proposed Development relies.
Increased sea level rise.	Increased risk of damage to assets and supporting infrastructure resulting from storm surges. Increased risk to staff both travelling to and on-Site as a result of more frequent or severe storm surges. Reduction in access, or damage, to assets resulting from a rise in sea level.

Decommissioning

- 6.3.16 The nature of risks during decommissioning are considered similar to those during construction, therefore, this phase is **Scoped In** to the assessment.

Cumulative and in-combination impacts

- 6.3.17 For the CCR Assessment, a cumulative impact would be where other developments may increase the climate risks to the Proposed Development. It is expected these cases are likely to be rare but risks of CCR cumulative impacts will remain **Scoped In** and will be reported, where relevant, in the CCR chapter of the ES. It is considered unlikely that significant cumulative CCR effects will be identified, or where the potential for these is identified, it is expected that mitigation will be included within the wider environmental and engineering design approaches.
- 6.3.18 Cumulative ICCI impacts would occur where climate change impacted upon other environmental receptors which were themselves at risk from cumulative impacts. It is expected these cases are likely to be rare but risks of ICCI cumulative impacts will remain **Scoped In** as part of the main review of ICCI risks and reported (where applicable) in each ES topic chapter.

Embedded Mitigation

- 6.3.19 In terms of CCR, it is envisaged that a CEMP will form part of the embedded mitigation. A Framework CEMP will be prepared as part of the Application, providing an overview of management measures in particular related to flood risk and extreme weather events during construction. This mitigation further justifies the decision to **Scope Out** the assessment of CCR for the construction phase of the Proposed Development.
- 6.3.20 It is expected that a range of design, maintenance and enhancement measures will be considered as the project progresses which may include:

- staff safety during extreme heat events being carefully considered and incorporated into building design;
- surface drainage of the Proposed Development Site considering projected climate change, specifically seasonal shifts in rainfall (a higher proportion of the annual rainfall occurring in the winter months) and intense rainfall events following dry periods in the summer; and
- drought and possible water shortages being considered in both design and operation, with a view to making processes and assets as water efficient as possible and investigating ways to recycle water within processes.

6.3.21 During operation, mitigation measures will include design considerations such as considering climate resilient plant species (i.e. drought or flood resistant) within the Outline LBMEP that accompanies the Application; designing drainage systems for extreme flood events (to be set out in the Outline Drainage Strategy that accompanies that Application) and using building materials that will aid natural cooling and ventilation.

6.3.22 Additional design measures may include, but not be limited to:

- climate resilient design in accordance with best practice planning, design and engineering practice and codes (e.g. UK Government guidance on designing resilient infrastructure¹²¹ and Environment Agency guidance on making allowances for rainfall and flood probability due to climate change¹²²);
- material specifications which increase the resilience of structures, foundations and surfaces to higher temperatures and more frequent and intense storm events and flooding, e.g. the use of hydraulically bound materials in foundations; and
- flood mitigation measures, including compensatory floodwater storage, alterations to the locations of embankments, or localised re-profiling of land, in collaboration with the relevant environmental disciplines.

6.3.23 For the decommissioning phase, embedded mitigation will be included in the ES which commits the Applicant to review and consider CCR risks as part of a DEMP to be produced prior to eventual decommissioning of the Proposed Development; recognising that the DEMP will be developed a number of decades from now when climate conditions for the time period will be better understood and technologies and techniques to mitigate any risks will have evolved. A DEMP would be secured by requirement of the draft DCO.

Summary of Potential Likely Significant Effects

6.3.24 Table 6.19 below summarises the potential construction, operation and decommissioning impacts relevant to both the CCR and ICCI assessments proposed to be **Scoped In** or **Scoped Out** of the EIA.

Table 6.19: Climate resilience elements scoped in or scoped out of future EIA.

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline(s)				
CCR Assessment	Construction		✓	It is unlikely that climate changes between present day and the construction period will be so different as to require further assessment. It is anticipated that construction best practice will mitigate any potential effects on-site during the construction period.
	Operation	✓		Future climate for the study area is projected to change as outlined within Table 6.16 and Table 6.17 and as such further assessment will be undertaken at ES.
	Decommissioning	✓		Future climate for the study area is projected to change as outlined within Table 6.16 and Table 6.17 and as such further assessment will be undertaken at ES.
ICCI Assessment	Construction		✓	It is unlikely that climate changes between present day and the construction period will be so different as to require further assessment. It is anticipated that construction best practice will mitigate any potential effects on-site during the construction period.
	Operation	✓		Future climate for the study area is projected to change as outlined within Table 6.16 and Table 6.17 and as such further assessment will be undertaken at ES.
	Decommissioning	✓		Future climate for the study area is projected to change as outlined within Table 6.16 and Table 6.17 and as such further assessment will be undertaken at ES.

6.3.25 For both CCR and ICCI assessments it is proposed that the impact of heat on key receptors is **Scoped Into** the assessment as, despite the climate modelling provided within Table 6.16 and Table 6.17 showing minor changes in heat, further assessment is needed to understand the impact of

increased temperatures on the operational processes of the Proposed Development.

Proposed Assessment Methodology

Key Receptors

- 6.3.26 A full list of receptors including assets and processes that may be impacted by climate change will be identified and assessed as part of the assessment process. Examples of potential receptors are provided within Table 6.20.

Table 6.20: Potential receptors associated with the CCR assessment

Potential receptor	Examples
Buildings and associated infrastructure	HPF including steam CH ₄ reforming units, utilities infrastructure and testing facilities; Hydrogen Pipeline(s) with associated customer spur pipelines; existing CATS Terminal (providing HPF feedstock), Proposed CO ₂ Export Connection Corridor, generating station.
Infrastructure structures	Wastewater Connection Corridor, Effluent Water Connection Corridor, Raw Water Connection Corridor, Electrical Connection Corridor.
Other infrastructure	Construction Haul Road.
Transport	Vehicles to and from the Proposed Development Site.
Drainage	Site drainage infrastructure for the mitigation of surface water flooding. Drainage related greenspace/ vegetation.
Electrical equipment	Electrical equipment associated with the operation of the HPF and associated infrastructure.
Construction, operation and decommissioning staff	Construction workers, workers delivering materials and plant to site and operational workers working on-site.

Assessment Criteria

- 6.3.27 Using the IEMA guidance¹²⁷, the assessment will follow a two-step process to assess each impact and identify the risk to the Proposed Development arising from projected climate change. This method will be applied for both the CCR and ICCI assessments.
- 6.3.28 Throughout this methodology, the terms ‘impact’ and ‘risks’ are used. These are defined through examples as follows:
- impact: the impact of climate change within the location of the Proposed Development e.g. increased rainfall (change in climate) results in increased flooding (climate impact); and
 - risks: the result of the climate impact on the receptors within the Proposed Development e.g. increased flooding (climate impact) may cause damage to Proposed Development (risk).

6.3.29 The two steps include:

1. Qualitative assessment of impacts: Each identified impact will be incorporated into a risk assessment and scored based on a combination of:
 - a) the sensitivity of the receptor (for CCR key receptors which have been identified, for ICCI receptors identified by other relevant chapters);
 - b) the likelihood of the impact occurring; and
 - c) the consequence of the resultant impact.

6.3.30 The risk assessment will also consider any existing mitigation measures within the design of the Proposed Development and identify the need for any additional resilience measures to protect against the impacts of climate change, based on those risks assessed as 'high' or 'very high'.

6.3.31 As per IEMA guidance¹²⁷, it is acknowledged that there is no legislative definition of 'significance'; the judgement of whether an effect is significant/ the level of significance is based on professional opinion of the topic specialist, in conjunction with project team.

6.3.32 For the CCR assessment, IEMA guidance¹²⁷ states: *"appropriate criteria for sensitivity, magnitude and significance for the climate resilience assessment should be developed on a project-by-project basis by the CCAR Coordinator in conjunction with the EIA Coordinator, and should take into account the aims/purpose of the project."*

6.3.33 For the ICCI assessment, IEMA guidance¹²⁷ states: *"this assessment should use the approach, methodology and significance criteria used by the other topics being assessed as part of the EIA and reported within the Environmental Statement."*

6.3.34 To understand the predicted future climate impacts posed to the Proposed Development Site, the following climate change projection data will be analysed:

- future projected climate conditions and extreme weather events for the area encompassing the Proposed Development Site will be further analysed for the periods covering the operational life of the Proposed Development and decommissioning;
- the future climate baseline will be established using the historical baseline data (using Met Office provided HadUK data¹³⁵), and projected

¹³⁵ Met Office (2020) HadUK- Grid Overview. Available at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/data/haduk-grid/overview> [Accessed 24/01/2025].

changes in average climate conditions from UKCP18 probabilistic climate change projections (both regional¹³⁶ and probabilistic¹³⁷); and

- in the ES, climate change projections for a range of meteorological parameters will be presented for different probability levels within the RCP8.5 high emission scenario¹³⁸ for the near-term and long-term future time periods for the 2060s.

6.3.35 It is considered unlikely that significant climate resilience effects will be identified. In the case that significant effects are identified it is expected that mitigation will be included within wider environmental and engineering design approaches. This will be confirmed through the process of assessment within the ES.

Assumptions, Limitations and Uncertainties

6.3.36 The CCR and ICCI assessment currently has the following known limitations:

- there is limited design information availability at the time of writing the EIA Scoping Report. The assessment within the ES will be in line with the latest available design information at the time of submission. Where design information is unknown or unavailable, reasonable assumptions will be made;
- the assessment will largely be qualitative, particularly the process of scoring risks;
- there is limited guidance on how to use meteorological information to assess individual risks to the Proposed Development;
- there is inherent uncertainty in climate change projections. This initial assessment has been conducted using UKCP18, the latest set of probabilistic projections for the UK; and
- there is often uncertainty in the relationship between changes in climate impacts and how asset performance responds to this change in climate. This uncertainty has been assessed qualitatively.

¹³⁶ Met Office (n.d) Regional (12km) and Local (2.2km) Projections. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/science/high-res-projections> [Accessed 24/01/2025].

¹³⁷ Met Office (2022) UKCP Probabilistic Projections. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/science/probabilistic-projections> [Accessed 24/01/2025].

¹³⁸ Hausfather, Z (2019) Explainer: The high-emissions 'RCP8.5' global warming scenario. Available at: <https://www.carbonbrief.org/explainer-the-high-emissions-rcp8-5-global-warming-scenario/> [Accessed 24/01/2025].

6.4 Cultural Heritage

Overview

- 6.4.1 This Section sets out the proposed scope and methodology for assessment of effects of the Proposed Development on cultural heritage. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.4.2 This chapter should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report and is supported by the following figures in Appendix A and appendices (Volume II):
- Figure 6.4.1: Cultural Heritage Assets; and
 - Appendix F: Gazetteer of Cultural Heritage Assets.

Legislation, Policy and Guidance Context

- 6.4.3 The following legislation, policy and guidance will be considered in the ES:
- The Ancient Monuments and Archaeological Areas Act (1979)¹³⁹;
 - The Planning (Listed Buildings and Conservation Areas) Act (1990)¹⁴⁰;
 - The Town and Country Planning (Development Management Procedure) (England) Order (2015)¹⁴¹;
 - The Infrastructure Planning (Decisions) Regulations (2010)¹⁴²;
 - The Overarching NPS for Energy (EN-1) (2024)²⁶;
 - The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
 - The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
 - The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
 - The NPPF (2024)²⁷;
 - The PPG (2024)³⁵;
 - SBC Local Plan (2019)³⁰;

¹³⁹ UK Government (1979) The Ancient Monuments and Archaeological Areas Act 1979.

¹⁴⁰ UK Government (1990) Planning (Listed Buildings and Conservation Areas) Act 1990.

¹⁴¹ UK Government (2015) The Town and Country Planning (Development Management Procedure) (England) Order 2015.

¹⁴² UK Government (2010) The Infrastructure Planning (Decisions) Regulations 2010.

- Policy HE 1 – Conservation and Enjoyment of the Historic Environment; and
- Policy HE 2 – Conserving and Enhancing Stockton’s Heritage Assets;
- RCBC Local Plan (2018)³¹:
 - Policy HE 1 – Conservation Areas;
 - Policy HE 2 – Heritage Assets; and
 - Policy HE 3 – Archaeological Sites and Monuments;
- Historic England: Good Practice Advice (GPA) Note 2: Managing Significance in Decision-Taking in the Historic Environment (2015)¹⁴³;
- Historic England: GPA Note 3: The Setting of Heritage Assets (2017)¹⁴⁴;
- Historic England: Statements of Heritage Significance: Analysing Significance in Heritage Assets (2019)¹⁴⁵;
- Historic England: Conservation Principles, Policies and Guidance (2008)¹⁴⁶;
- Chartered Institute for Archaeologists (CiFA): Standard and Guidance for Historic Environment Desk-based Assessment (2020)¹⁴⁷;
- IEMA, Institute of Historic Building Conservation (IHBC) & CiFA: Principles of Cultural Heritage Impact Assessment in the UK (2021)¹⁴⁸; and

¹⁴³ Historic England (2015) Managing Significance in Decision-Taking in the Historic Environment. Historic Environment Good Practice in Planning: 2. Swindon: Historic England. Available at: <https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/gpa2/> [Accessed 29.11.24].

¹⁴⁴ Historic England (2017) The Setting of Heritage Assets. Historic Environment Good Practice in Planning Note 3. Swindon: Historic England. Available at: <https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets/> [Accessed 29.11.24].

¹⁴⁵ Historic England (2019) Statement of Heritage Significance: Analysing Significance in Heritage Assets Historic England Advice Note 2. Swindon: Historic England. Available at: <https://historicengland.org.uk/images-books/publications/statements-heritage-significance-advice-note-12/> [Accessed 29.11.24].

¹⁴⁶ Historic England (2008) Conservation Principles, Policies and Guidance. Swindon: Historic England. Available at: <https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/conservationprinciplespoliciesandguidanceapril08web/> [Accessed 29.11.24].

¹⁴⁷ Chartered Institute for Archaeologists (2020) Standard and Guidance for Historic Environment Desk-Based Assessment. Reading: University of Reading. Available at: https://www.archaeologists.net/sites/default/files/CiFAS%26GDBA_4.pdf [Accessed 29.11.24].

¹⁴⁸ Institute of Environmental Management and Assessment, Institute of Historic Building Conservation & Chartered Institute for Archaeologists (2021) Principles of Cultural Heritage Impact Assessment in the UK. Available at: https://www.archaeologists.net/sites/default/files/j30361_iema_principlesofchia_v8.pdf [Accessed 29.11.24].

- SoS criteria for Scheduling Monuments (Scheduled Monument Statement) (2013)¹⁴⁹.

Consultation

- 6.4.4 No engagement has been undertaken to date with statutory consultees with respect to the scope or assessment methodology for cultural heritage; it is proposed that this be agreed via the EIA Scoping Opinion request.
- 6.4.5 Following receipt of the EIA Scoping Opinion, additional technical engagement will be undertaken with relevant consultees including RCBC Strategy Planning Team, Tees Archaeology, SBC Conservation Team and Historic England to address any comments raised in the EIA Scoping Opinion, and to agree the requirement/ timing for any further evaluation, and where advised, mitigation.

Baseline Conditions and Receptors

Study area

- 6.4.6 It is proposed that the cultural heritage assessment will adopt the following defined study areas shown on Figure 6.4.1 (Appendix A) which have also been used for this EIA Scoping Report:
- **Inner study area:** the boundary of Proposed Development Site (Figure 1.2) will be used to identify any cultural heritage assets that could be directly or indirectly affected by the Proposed Development, using the proposed baseline data collection outlined in this section. This Inner study area includes the key components of the Proposed Development i.e. the HPF Area and the Hydrogen Pipeline(s) which extends across both sides of the River Tees (Hydrogen Pipelines (east and west)) including customer off-taker pipelines.
 - **Outer study area:** a wider study area extending up to 200 m from the Inner study area (Figure 6.4.1) will be used to identify designated and non-designated assets and archaeological events recorded in the HER that provide information on the archaeological and historic context of the Inner study area. It will also be used to identify cultural heritage assets with statutory or non-statutory designations where the Proposed Development could have an impact on setting. With the exception of the HPF, the Outer study area principally follows pipeline routes over a large area, and so this proposed study area is expected to suitably capture relevant archaeological information.
- 6.4.7 The study area has been derived using professional judgement. It is

¹⁴⁹ Department for Culture, Media & Sport (2013) Scheduled Monuments and nationally important but non-scheduled monuments. London: DCMS. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/249695/SM_policy_statement_10-2013_2.pdf [Accessed 29.11.24].

considered to be appropriate for capturing a suitable data set (from the HER) to inform an understanding of the archaeological context and is proportionate to the to the predicted magnitude of impacts (physical impacts to archaeological remains and impacts to setting designated heritage assets) for the HPF and Hydrogen Pipeline components of the Proposed Development.

Baseline Conditions and Receptors

Existing Baseline

- 6.4.8 The existing baseline presented in this section is based on data extracts received from the Tees Archaeology and Redcar & Cleveland HER, designated heritage assets recorded in the National Heritage List for England (NHLE), and a review of historic and modern mapping and relevant technical reports.

Historic Landscape Character

Hydrogen Production Facility

- 6.4.9 The HPF Area is located adjacent to the boundary of the existing CATS Terminal in an area of former tidal mudflats which was reclaimed in the 1970s for industrial usage.

Hydrogen Pipelines (east)

- 6.4.10 The Hydrogen Pipeline (east) extends from the HPF Area (west of the River Tees) to the Wilton International complex (east of the River Tees) and is anticipated to largely follow existing/ established buried and above ground pipeline routes but will likely require some new above ground infrastructure. West of the River Tees, the Hydrogen Pipeline (east) crosses industrial areas that are located on land reclaimed from tidal mudflats in the 1970s. No other relevant historic landscape character features are relevant to the Hydrogen Pipeline (east) given previous industrial land-uses. The River Tees crossing will be via the installation of a pipeline within a pre-existing tunnel, or will cross below the river in competent strata via a new HDD or MBT crossing as described in paragraphs 3.3.20 - 3.3.25.

Hydrogen Pipelines (west)

- 6.4.11 The Hydrogen Pipelines (west) will extend from the HPF Area west, towards the village of Cowpen Bewley. The majority of this pipeline route is anticipated to largely follow existing/ established buried and above ground pipelines and other infrastructure located to the north of Saltholme Nature Reserve. The northern part of the pipeline will follow Cowpen Bewley Road through agricultural fields, and fields south of the village of Cowpen Bewley which are situated within the boundary of the Cowpen Bewley Conservation

Area, and which contain ridge and furrow earthworks, though this will be adjacent and parallel to existing buried gas pipelines. The Hydrogen Pipeline(s) will follow some existing below ground pipeline routes but will require some new above ground infrastructure including a number of AGI.

- 6.4.12 An additional customer spur pipeline is also proposed which will cross previously undeveloped fields. Ridge and furrow earthworks are also recorded in this area, as well as more recently identified Romano-British settlement features, discussed below.

Cultural Heritage Assets within the Inner study area

Designated Heritage Assets

- 6.4.13 There are six Listed Buildings located in the Inner study area: one Grade II* and five Grade II listed, all located in the Cowpen Bewley Conservation Area, in the west of the Inner study area. The Cowpen Bewley Conservation Area is centred on the medieval core of the village of Cowpen Bewley and includes a number of fields surrounding the village which contain medieval ridge and furrow earthworks (**1513**; **1519**).

Non-designated Heritage Assets

- 6.4.14 A summary of non-designated cultural heritage assets recorded in the Tees Archaeology and Redcar & Cleveland HERs within the Inner study area is presented below. Further details of these cultural heritage assets are provided in Appendix F: Gazetteer of Cultural Heritage Assets (Volume II) and their locations are illustrated on Figure 6.4.1 (Appendix A).
- 6.4.15 Unless otherwise specified below, it is currently anticipated that these assets will be avoided or not likely impacted by the Proposed Development, based upon the current design information.
- There is one cultural heritage asset of Bronze Age date recorded in the Inner study area. This comprises a series of ditches which contained Bronze Age pottery recorded during a watching brief at the Wilton International complex¹⁵⁰.
 - There are six cultural heritage assets of Romano-British date recorded in the Inner study area.
 - a coin findspot (**1458**) found near Manor Farm north of the village of Cowpen Bewley; and
 - settlement features, and artefacts (**9068**; **9438**; **9439**; **9502**; **9523**) which were recorded during a series of archaeological investigations (Event **1468**; **1470**; **1497**; **1498**) undertaken at Saltholme in advance of the construction of a gas-fired electricity generating facility. The evidence recovered was considered to be

¹⁵⁰ Cotswold Archaeology (2019) Material Handling Facility and Mineral Transport System, Wilton, Borough of Redcar & Cleveland. Cotswold Archaeology. Report No. 660829. See Event 977.

similar to other Roman sites recorded in the region, including villa sites such as Ingleby Barwick. It was also suggested that the presence of roof tile may indicate that a high-status building was located in the vicinity¹⁵¹. The route of the proposed Customer Spur Pipeline 1 is close to this archaeological site.

- There are 12 cultural heritage assets of medieval date recorded in the Inner study area.
 - Cowpen Bewley medieval settlement (**604**), including possible deserted medieval property plots (**624**) and finds of medieval pottery (**3612**) recovered from a midden;
 - ridge and furrow earthworks of possible medieval origin located around the edges of Cowpen Bewley (**1513**; **1519**), crossed by the Hydrogen Pipeline (west) (**1519**); and at Saltholme (**658**), at the location of the proposed Customer Spur Pipeline 1;
 - the site of the deserted medieval village of West Coatham (**355**); and
 - the locations of five former medieval salt mounds (**3749**; **3750**; **3751**; **3752**; **3754**) are recorded in the Inner study area north of Wilton International complex. These features are no longer extant.
- There are 29 cultural heritage assets of post-medieval to modern date recorded in the Inner study area.
 - ridge and furrow earthworks of post-medieval date (**1516**);
 - the findspot of a 17th century coin (**3461**);
 - farmsteads and buildings (**6280**; **9353**; **9354**; **9355**; **9356**; **9357**; **9358**; **9359**; **9360**; **4223**) of 18th and 19th century date, either recorded from historic maps or surviving as extant buildings, located in the village of Cowpen Bewley;
 - 19th century railway lines and associated infrastructure (**4172**; **4222**; **5908**; **8717**);
 - a 19th century saltworks (**4301**);
 - flood defences and reclamation embankments (**8262**; **5602**; **6046**) of 18th and 19th century date;
 - a 19th century mill race (**5716**); and
 - Second World War sites including a bombing decoy (**3602**; **3623**; **3628**); pillboxes (**3287**; **6792**); and an anti-aircraft battery (**6793**, including ammunition store **3286**). The former anti-aircraft battery, located south of the Billingham Community Fire Station, has been demolished, with the exception of the ammunition store, which

¹⁵¹ Platell, A (2020) Saltholme, Cowpen Bewley, Stockton on Tees. Post-excavation Assessment. Archaeological Services Durham University. Report No. 5049. Available at: <https://docs.planning.org.uk/20210113/154/QMRREPPK0DR00/2wgjhx81qc871p3.pdf> [Accessed 29.11.24].

survives as an extant building. The Hydrogen Pipeline (west) crosses the footprint of the former anti-aircraft battery.

Cultural Heritage Assets in the Outer study area

Designated Heritage Assets

- 6.4.16 There is one designated heritage asset recorded adjacent to the Outer study area: Kirkleatham Conservation Area, immediately east of the Wilton International complex.

Non-designated Heritage Assets

- 6.4.17 Further non-designated cultural heritage assets are recorded in the Tees Archaeology and Redcar & Cleveland HER within the Outer study area, including findspots of Neolithic to Bronze Age date, two Romano-British burials, and sites dating from the medieval to modern periods.

Assessment of Archaeological Potential

Hydrogen Production Facility

- 6.4.18 The initial baseline assessment suggests that there is a negligible potential for the survival of archaeological remains within the proposed HPF Area due to existing development. This area is located within an area of tidal mudflats which was reclaimed in the 1970s and therefore development will mostly be within modern made ground.
- 6.4.19 Well-preserved peat deposits have been found within the Tees Estuary and in Hartlepool Bay. Mesolithic, Neolithic, and Bronze Age layers have all been recorded within the peat deposits^{152,153}. Initial geotechnical investigations¹⁵⁴ have shown that made ground within the HPF Area has a combined thickness of around 2.9m to 7 m. Thin bands of peat were observed in underlying upper cohesive alluvium in two boreholes, and within one borehole in the lower cohesive alluvium. No substantial, or uniform layers of peat/ organic material were recorded. Based on this initial review of geotechnical information, it is assessed that the potential to encounter

¹⁵²Carter, S (2014) Intertidal Prehistoric Peat Beds at Redcar, North-east England: AxeMarks the Spot? Teesside Archaeological Society. Teesscapes 1. Available at: <https://archaeologydataservice.ac.uk/library/browse/issue.xhtml?recordId=1154508&recordType=GreyLitSeries> [Accessed 29.11.24].

¹⁵³ Fell, D and Robinson, G (2016) Bronze Age, Late Iron Age and Roman Occupation at Marsh House Farm, Greatham. Northern Archaeological Associates. Available at: <https://archaeologydataservice.ac.uk/library/browse/issue.xhtml?recordId=1163937&recordType=GreyLitSeries> [Accessed 29.11.24].

¹⁵⁴ Arup (2023) H²NorthEast: Preliminary Ground Investigation: Geo-environmental Interpretive Report. Reference: 286378-ARP-XX-XX-RP-CG-0008. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/BC080001/BC080001-000529-6.2.18.3%20ES%20Appendix%2018.3%20Geotechnical%20and%20Geo-environmental%20Interpretive%20Report.pdf> [Accessed 29.11.24].

such deposits during the construction works proposed within the HPF Area is low.

Hydrogen Pipelines (east)

- 6.4.20 An initial baseline assessment suggests that there is a negligible potential to encounter archaeological remains within the footprint of the Hydrogen Pipeline (east), primarily because it is located within previously developed areas and its route follows existing pipeline routes and infrastructure which will have removed any archaeological remains, if previously present.

Hydrogen Pipelines (west)

- 6.4.21 Initial baseline assessment suggests that there are three areas of archaeological potential within the footprint of the Hydrogen Pipeline (west). These include:
- an area of possible medieval ridge and furrow earthworks (**658**) and Romano-British settlement recorded at Saltholme, located close to/overlying the proposed Customer Spur Pipeline 1;
 - an area of possible medieval ridge and furrow earthworks (**1519**) immediately south of Cowpen Bewley, which is crossed by the Hydrogen Pipeline (west); and
 - archaeological features associated with the former anti-aircraft battery (**6793**) located south of the Billingham Community Fire Station.

Future Baseline

- 6.4.22 The future baseline is unlikely to undergo substantial changes in comparison to the existing baseline. Below ground archaeological remains are not expected to substantially change unless changes to their environment occur through human intervention or natural actions. Further archaeological remains may be discovered through archaeological investigations where committed developments are implemented within the Proposed Development Site boundary. Built heritage assets have the potential to change both in terms of setting changes (caused by other committed developments) or due to decay to their fabric. There also remains the possibility that assets could be designated, although this is difficult to forecast.

Potential Impacts

Construction

Hydrogen Production Facility

- 6.4.23 No cultural heritage assets have been identified within the HPF Area and no

archaeological impacts are therefore predicted to arise from construction activities proposed within the HPF Area.

- 6.4.24 The Proposed Development infrastructure within the HPF Area will be similar in form and scale to the existing plant on the CATS Terminal Site. Smaller structures may be founded on raft foundation within the made ground, whilst others, including the generating station and gas flare are likely to require piled foundations. Based on the currently available information (see paragraph 6.4.19) it is suggested that the potential to encounter significant peat deposits containing archaeological evidence is low. As such the possibility that piled foundations could impact such deposits is not likely.
- 6.4.25 It is proposed that further assessment in relation to below ground heritage within the HPF Area during construction is **Scoped Out** from further assessment as no LSE are predicted.
- 6.4.26 Greatham Creek (Wastewater Connection Corridor) will require some works to the embankment north of the HPF Area, however, as this is a 1970s reclamation embankment, it is not considered to be of heritage interest. An assessment of the impacts to marine heritage receptors in and around the HPF Area during construction is therefore proposed to be **Scoped Out** as no LSEs are predicted. Should assumptions in relation to works below MHWS change during the EIA, a proportionate approach to assessment of potential effects on marine heritage assets will be agreed via technical engagement with relevant stakeholders.

Hydrogen Pipelines (east)

- 6.4.27 It is anticipated that the Hydrogen Pipeline (east) will be installed predominantly below ground, with above ground elements only where off-taker connections are required, although this is subject to further design development and the design (including any optionality retained) will be confirmed in the ES that accompanies the Application. An indication of the likely construction methodologies are outlined in paragraphs 3.3.14 - 3.3.19.
- 6.4.28 Where the Hydrogen Pipeline (east) is located west of the River Tees, it is within reclaimed land (made ground) and is anticipated to follow existing pipeline routes. As such, no impacts are predicted along this section of the Hydrogen Pipeline, based upon current available design information.
- 6.4.29 The anticipated construction methods for the River Tees crossing are described in paragraphs 3.2.23 - 3.2.25. Any new excavation will be within competent strata below the riverbed. As described in paragraph 3.3.22, landing points on either side of the river will be within existing industrial areas. As such no impacts are predicted along this section of the Hydrogen Pipeline (east). An assessment of the impacts to marine heritage receptors

within the Hydrogen Pipelines (east) during construction is therefore proposed to be **Scoped Out** as no LSE are predicted.

- 6.4.30 East of the River Tees, the Hydrogen Pipeline (east) is anticipated to follow existing pipeline routes. As such, no impacts are likely along this section because previous construction will have removed any previously present archaeological remains, if present. It is therefore proposed that further assessment in relation to below ground heritage within the Hydrogen Pipeline (east) during construction is **Scoped Out** as no LSE are predicted.

Hydrogen Pipeline (west)

- 6.4.31 The following potential direct physical impacts to archaeological remains have been identified on the proposed route of the Hydrogen Pipeline (west) (including Customer Spur Pipeline 1):

- impacts to ridge and furrow earthworks (**658**) at Saltholme;
- impacts to previously unrecorded remains of Romano-British date which may be present at Saltholme, within the footprint of the proposed Customer Spur Pipeline 1;
- impacts to an area of possible medieval ridge and furrow earthworks (**1519**) immediately south of Cowpen Bewley which is crossed by the west Hydrogen Pipelines; and
- impacts to archaeological features associated with the former anti-aircraft battery (**6793**) located south of the Billingham Community Fire Station.

- 6.4.32 It is predicted that any such archaeological impacts caused by the installation of the proposed pipelines within the Hydrogen Pipelines (west) would be of low magnitude (due to the limited ground impacts required for the installation of pipelines) and could reasonably be mitigated through design (preservation in situ), or by a programme of archaeological investigation (preservation by record) (refer to Embedded Mitigation). An assessment of the impacts on below ground archaeology within the Hydrogen Pipeline (west) during construction is therefore proposed to be **Scoped In**.

- 6.4.33 In addition to those physical impacts identified above, potential temporary impacts during construction to the setting of the following designated heritage assets have been identified due to potential noise and lighting which may arise from the Proposed Development and require further assessment:

- Cowpen Bewley Conservation Area; and
- Listed Buildings in the Cowpen Bewley Conservation Area.

- 6.4.34 An assessment of the impacts on the setting of these cultural heritage

assets within the Hydrogen Pipeline (west) during construction is therefore proposed to be **Scoped In**.

Operation

Hydrogen Production Facility

- 6.4.35 Based upon an initial assessment, no cultural heritage impacts are predicted to arise during the operation of the Proposed Development within the HPF Area. Any impacts on below ground remains, if these were to occur, would arise and be assessed during the construction phase. There are no cultural heritage assets (including built heritage) within the Inner study area and Outer study area whose setting is likely to be impacted by any light or noise associated with the operation of the Proposed Development. It is therefore proposed that this matter is **Scoped Out** as no LSE are predicted.

Hydrogen Pipelines (east)

- 6.4.36 No direct cultural heritage impacts, or setting impacts, are predicted to arise during the operation of the Hydrogen Pipeline (east). It is therefore proposed that this matter is **Scoped Out** as no LSE are predicted.

Hydrogen Pipeline (west)

- 6.4.37 No direct cultural heritage impacts are predicted to arise during the operation of the Hydrogen Pipeline (west). Any impacts would arise and be addressed at the construction phase. It is therefore proposed that this matter is **Scoped Out** as no LSE are predicted.
- 6.4.38 It is possible that the installation of new above ground infrastructure as part of Hydrogen Pipeline (west) could impact the setting of designated heritage assets identified within the Baseline Conditions and Receptors section. An assessment of the impacts on the setting of these cultural heritage assets within the Hydrogen Pipeline (west) during operation is therefore proposed to be **Scoped In**.

Decommissioning

Hydrogen Production Facility, and Hydrogen Pipelines

- 6.4.39 No impacts on below ground heritage assets are predicted to arise during the decommissioning of the Proposed Development within the HPF Area. Any impacts would arise and be addressed at the construction phase. Similarly, no cultural heritage impacts on below ground archaeology are predicted to arise during the decommissioning of the Hydrogen Pipeline (east/ west). Any impacts would arise and be addressed at the construction phase.

- 6.4.40 Temporary indirect impacts as a result of machinery to dismantle and remove pipelines may occur to the setting of designated assets in the Outer study area during decommissioning of the Hydrogen Pipeline (west), depending upon the methodology used at that time. Decommissioning is likely to affect the setting of those heritage assets described for 'construction' within the Potential Impacts section above and would be temporary and be expected to be of shorter duration than impacts during construction. The ES would describe the likely impacts in relation to decommissioning effects on cultural heritage assets (including built heritage) using the level of detail currently available. It is anticipated that this would be a qualitative description of how such impacts could be similar or different to the impacts of the construction phase to be assessed. Other than this qualitative appraisal, it is proposed that decommissioning impacts are **Scoped Out**.

Embedded Mitigation

Construction

- 6.4.41 Given the potential for impact on below ground, previously unrecorded archaeological remains in areas which have not previously been developed in the Hydrogen Pipeline (west) (refer to paragraph 6.4.40), it is anticipated that additional fieldwork (evaluation and mitigation) will be agreed during post-Scoping technical engagement with relevant consultees.
- 6.4.42 Where archaeological features are identified through evaluation, where reasonably practicable, design mitigation will be considered to avoid identified areas of constraint (preservation in situ). Where cultural heritage assets cannot be avoided, archaeological excavations or archaeological monitoring during construction in archaeologically sensitive areas would be undertaken to mitigate against the loss of cultural heritage assets (preservation by record) secured via requirement of the draft DCO.

Operation

- 6.4.43 Design mitigation will be considered in order to avoid, or minimise, visual impacts on designated built heritage assets within the Cowpen Bewley Conservation Area.

Decommissioning

- 6.4.44 A DEMP is proposed to be secured via a requirement of the draft DCO that could be used to address potential effects on the setting of built heritage assets during decommissioning of the Proposed Development. Further details will be set out in the ES.

Summary of Potential Likely Significant Effects

6.4.45 Table 6.21 provides a summary of the cultural heritage elements that are proposed to be **Scoped In** or **Scoped Out** of the assessment, along with a justification for that decision.

Table 6.21: Cultural heritage elements scoped in or out of environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility				
Heritage Assessment	Construction		✓	No cultural heritage impacts are predicted due to the HPF Area being in an area of 1970s land reclamation and no cultural heritage assets have been identified within the existing CATS Terminal.
	Operation		✓	
	Decommissioning		✓	
Hydrogen Pipeline (east)				
Heritage Assessment	Construction		✓	No cultural heritage impacts are predicted along the route of the Hydrogen Pipeline (east). West of the River Tees it is within reclaimed land and is anticipated to follow existing pipeline routes. No new excavation in the riverbed is required for the River Tees crossing. East of the River Tees, it is anticipated to follow existing pipeline routes.
	Operation		✓	
	Decommissioning		✓	
Hydrogen Pipeline (west)				
Heritage Assessment	Construction	✓		Potential direct physical impacts to below ground archaeological remains, and potential indirect impacts to the setting of designated heritage assets have been identified on the proposed route of the Hydrogen Pipelines (west) that require further consideration.
	Operation	✓		Potential indirect impacts to the setting of designated heritage assets depending on whether the Hydrogen

Element	Phase	Scoped In	Scoped Out	Justification
				Pipeline is routed above or below ground.
	Decommissioning		✓	No cultural heritage impacts are predicted to arise during the decommissioning of the Hydrogen Pipeline (west).

Proposed Assessment Methodology

- 6.4.46 The assessment of effects of the Proposed Development on heritage assets will consider both direct and indirect (physical) effects and impacts which may arise as a result of changes to an asset's setting and nature (adverse or beneficial). The assessment will take into account the significance of the heritage asset including the contribution made by its setting and the magnitude of the predicted impact, using the framework described below.

Baseline Data Collection

- 6.4.47 The following information sources will be consulted as part of the desk-based assessment:

- **NHLE:** an online resource that provides details of all designated statutory assets (scheduled monuments, listed buildings, World Heritage Sites, registered parks and gardens, registered battlefields, conservation areas, Designated Wreck Sites, etc). These designated heritage assets are described in Appendix F: Gazetteer of Cultural Heritage Assets (Volume II);
- **Tees Archaeology and Redcar & Cleveland HER:** to obtain information on the locations of non-designated heritage assets and for archaeological events recorded within the study area (Inner and Outer). This data has already been obtained and is summarised earlier in this Section, and described in Appendix F: Gazetteer of Cultural Heritage Assets;
- **historic Ordnance Survey (OS) maps:** to provide information on the historic development of land-use within the Inner study area;
- aerial photography and satellite imagery covering the Inner study area, available online via Google Earth and Historic England's Aerial Photo Explorer;
- Lidar digital terrain model (DTM) data at 1 m resolution, available as an online resource from the Defra; and
- regional research frameworks.

- 6.4.48 Appropriate documentary sources, grey literature reports, archaeological journals, and a site walkover will be carried out in areas which are previously

undeveloped and have archaeological potential (on the route of the Hydrogen Pipeline (west) only), and to conduct a setting assessment where potential setting impacts are identified (see paragraphs 6.4.32 and 6.4.33). It is not proposed that a full walkover of the Hydrogen Pipeline is undertaken, or to visit previously developed, industrial areas. The approach to any additional fieldwork (evaluation and mitigation) will be agreed during post-Scoping technical engagement with relevant consultees.

Assessment Criteria

Receptors

Criteria for Assigning Significance to Cultural Heritage Assets

- 6.4.49 The attribution of relative significance of heritage assets identified by the study will be undertaken in accordance with the principles set out in the NPS EN-1 and NPPF. The NPPF defines significance of a heritage asset as: *“the value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic.”*
- 6.4.50 Table 6.22 summarises the relative significance of cultural heritage assets which will be used in the proposed assessment.

Table 6.22: Relative Significance of Cultural Heritage Assets

Significance of Asset	Definition / Criteria
High	Assets valued at a national level, including: World Heritage Sites Scheduled monuments sites of schedulable quality but not yet scheduled (i.e. that meet the relevant criteria for designation) Grade I, II* & II Listed Buildings Grade I, II* & II Registered Parks and Gardens Registered Historic Battlefields
Medium	Assets valued at a regional level, including: : non-designated archaeological sites and areas that have regional value (i.e. contributing to the aims of regional research frameworks) Conservation areas Locally Listed Buildings
Low	Assets valued at a local level, including: archaeological sites and areas of local importance Unlisted buildings and townscapes of some historic or architectural interest
Negligible	Assets of little or no intrinsic heritage value, including: sites of former archaeological features, where there are no longer any remains Unlisted buildings of little or no historic or architectural interest artefact find-spots (where the artefacts are no longer in situ and where their provenance is uncertain) poorly preserved examples of particular types of minor historic landscape features (e.g. field boundaries) geophysical anomalies that likely have a natural origin

Impacts

Criteria for Assessing Magnitude of Impacts

- 6.4.51 The proposed criteria which will be used for assessing the magnitude of predicted impacts is presented in Table 6.23. The criteria measure the degree of change to the baseline condition of a heritage asset, or its setting, that would result from the construction, operation and/ or decommissioning of the Proposed Development.
- 6.4.52 The effects of the Proposed Development on heritage assets will be assessed on the basis of their type (direct effects, indirect impacts, setting impacts, and cumulative impacts) and nature (adverse or beneficial).

Table 6.23: Magnitude of Impact

Magnitude of Impact	Definition	
	Adverse	Beneficial
High	Changes to the fabric or setting of a heritage asset resulting in the complete or near complete loss of the asset's cultural significance. Changes that substantially detract from how a heritage asset is understood, appreciated, and experienced.	Preservation of a heritage asset in situ where it would otherwise be completely or almost completely lost. Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated, and experienced.
Medium	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is appreciably altered. Changes that appreciably detract from how a heritage asset is understood, appreciated, and experienced.	Changes to important elements of a heritage asset's fabric or setting, resulting in its cultural significance being preserved (where this would otherwise be lost) or restored. Changes that improve the way in which the heritage asset is understood, appreciated, and experienced.
Low	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is slightly altered. Changes that slightly detract from how a heritage asset is understood, appreciated, and experienced.	Changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed. Changes that result in a slight improvement in the way a heritage asset is understood, appreciated, and experienced.
Negligible	Changes to fabric or setting of a heritage asset that leave its cultural significance unchanged and do not affect how it is understood, appreciated, and experienced.	

Effects

Criteria for Assessment of Effects to Setting

- 6.4.53 Historic England's guidance document, 'Historic Environment Good Practice in Planning Note 3 ('GPA3'): The Setting of Heritage Assets'¹⁴⁴, provides advice on setting assessments. The guidance builds upon the requirements outlined within the NPPF²⁷ and in PPG³⁵.
- 6.4.54 The NPPF (Annex 2: Glossary)²⁷ describes setting as: *"The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. 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."*
- 6.4.55 GPA 3 provides a five-step assessment process:

- **Step 1:** identify which heritage assets and their settings are affected;
- **Step 2:** assess the degree to which these settings make a contribution to the significance of the heritage asset(s) or allow significance to be appreciated;
- **Step 3:** assess the effects of the Proposed Development, whether beneficial or harmful, on that significance or on the ability to appreciate it;
- **Step 4:** explore ways to maximise enhancement and avoid or minimise harm; and
- **Step 5:** make and document the decision and monitor outcomes.

Assessing the Significance of Effects

6.4.56 The significance of the asset (Table 6.22) and the magnitude of the predicted impact (Table 6.23) will be used to inform the professional judgement of the potential likely significance of the resultant effect. Table 6.24 summarises the criteria that will be used for assigning the likely significance of effect. Where two outcomes are possible through application of the matrix, professional judgement, supported by reasoned justification, will be employed to evaluate the assessed level of significance. Major and moderate effects are considered to be 'significant'. Minor and negligible effects are considered to be 'not significant'.

Table 6.24: Significance of Effect

Magnitude of Impact	Significance of Asset			
	High	Medium	Low	Negligible
High	Major	Major/ Moderate	Moderate/ Minor	Minor
Medium	Major/ Moderate	Moderate	Minor	Minor/ Negligible
Low	Moderate/ Minor	Minor	Minor/ Negligible	Minor/ Negligible
Negligible	Minor	Minor/ Negligible	Minor/ Negligible	Negligible

Assumptions, Limitations and Uncertainties

6.4.57 Baseline conditions have been established through a combination of historical research, cartographic sources and data and records provided by third parties. Data provided by third parties is assumed to comply with standard practice and be up to date at the time of reporting. The baseline presented in this chapter and in Appendix F: Gazetteer of Cultural Heritage Assets is preliminary, relying primarily on data gathered through desktop

research.

- 6.4.58 A walkover survey has been conducted across the HPF Area; however no walkover surveys have been conducted across either the Hydrogen Pipelines (east or west).
- 6.4.59 The assessment has been undertaken using the current available design information for the Proposed Development and the maximum likely extents of land currently anticipated as required for its construction, operation and maintenance. Where the Proposed Development Site boundary (Inner study area) changes during the course of the EIA, reappraisal of affected heritage assets will be required.

6.5 Greenhouse Gases

Overview

- 6.5.1 This Section sets out the proposed scope and methodology for assessment of effects of the Proposed Development on GHG emissions. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.5.2 This Section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report. GHG emissions policy is intrinsically linked with climate resilience policy, therefore this Section should be read in conjunction with Section 6.3: Climate Change Resilience.

Legislation, Policy and Guidance Context

- 6.5.3 The methodology for the GHG assessment has been developed in line with relevant legislation, policy and industry guidance.
- 6.5.4 The following legislation, policy and guidance will be considered in the ES:
- The Kyoto Protocol (United Nations Framework Convention on Climate Change (UNFCCC) (1997)¹⁵⁵;
 - The Paris Agreement (UNFCCC) (2015)¹⁵⁶;
 - The Climate Change Act (2008)¹¹⁷;

¹⁵⁵ United Nations Framework Convention on Climate Change (1997) Kyoto Protocol. Available at: <https://unfccc.int/process-and-meetings/the-kyoto-protocol/history-of-the-kyoto-protocol/text-of-the-kyoto-protocol> [Accessed 24/01/2025].

¹⁵⁶ United Nations Framework Convention on Climate Change (2015) Paris Agreement. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement> [Accessed 24/01/2025].

- The Climate Change Act 2008 (2050 Target Amendment) Order (2019)¹⁵⁷;
- The Overarching NPS for Energy (EN-1) (2024)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (2024)²⁷;
- The PPG on Climate Change (2019)¹⁵⁸;
- UK Clean Growth Strategy (2018)¹⁵⁹;
- UK Hydrogen Strategy (2021)¹⁶⁰;
- SBC Local Plan (2019)³⁰;
- RCBC – “A Greener Future – The Climate Change Emergency” (2021)¹⁶¹;
- RCBC Local Plan (2018)³¹;
- Tees Valley Net Zero: Cluster Plan (2023)¹⁶²;
- Tees Valley Net Zero Strategy (2023)¹⁶³;
- UK Low Carbon Hydrogen Standard (2023)¹⁶⁴;
- IEMA Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)⁴²;

¹⁵⁷ UK Government (2019) The Climate Change Act 2008 (2050 Target Amendment) Order 2019.

¹⁵⁸ UK Government (2019) National Planning Policy Guidance on Climate Change. Available at: <https://www.gov.uk/guidance/climate-change> [Accessed 24/01/2025].

¹⁵⁹ UK Government (2018) Clean Growth Strategy. Available at: <https://assets.publishing.service.gov.uk/media/5ad5f11ded915d32a3a70c03/clean-growth-strategy-correction-april-2018.pdf> [Accessed 24/01/2025].

¹⁶⁰ UK Government (2021) UK Hydrogen Strategy. Available at: https://assets.publishing.service.gov.uk/media/64c7e8bad8b1a70011b05e38/UK-Hydrogen-Strategy_web.pdf [Accessed 24/01/2025].

¹⁶¹ Redcar and Cleveland Borough Council (2021) A Greener Future – The Climate Emergency. Available at: <https://greenerfuture.redcar-cleveland.gov.uk/> [Accessed 24/01/2025].

¹⁶² Tees Valley Combined Authority (2023) Tees Valley Net Zero Cluster Plan Key Findings. Available at: <https://teesvalley-ca.gov.uk/business/wp-content/uploads/sites/3/2023/03/Net-Zero-TV-Key-Findings-Document-8.pdf> [Accessed 24/01/2025].

¹⁶³ Tees Valley Combined Authority (2023) Net Zero Strategy for Tees Valley. Available at: <https://teesvalley-ca.gov.uk/business/wp-content/uploads/sites/3/2023/03/Net-Zero-strategy-Digital.pdf> [Accessed 24/01/2025].

¹⁶⁴ UK Government (2023) UK Low Carbon Standard, Greenhouse Gas Emissions Methodology and Conditions of Standard Compliance, Version 3. Available at: <https://www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria> [Accessed 24/01/2025].

- World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines (2024)¹⁶⁵;
- Government Construction Industry Strategy (2013)¹⁶⁶;
- Hydrogen production with carbon capture: emerging techniques (2023)¹⁶⁷;
- London Energy Transformation Initiative (LETI) Embodied Carbon Primer (2020)¹⁶⁷;
- PAS 2080:2023 Carbon Management in Infrastructure and Buildings (2023)¹⁶⁸;
- Royal Institution of Chartered Surveyors (RICS) Whole Life Carbon Assessment for the built environment (2nd edition) (2017)¹⁶⁹;
- IEMA Pathways to Net Zero: Using the GHG Management Hierarchy (2020)¹⁷⁰; and
- BS EN 17472:2022 Sustainability of construction works – sustainability assessment of civil engineering works – calculation method (2022)¹⁷¹.

Consultation

6.5.5 There is no statutory stakeholder for climate matters and therefore no formal consultation has been undertaken to date. It is anticipated that the EIA Scoping Opinion will provide the agreed basis for the assessment presented in the ES. Comments received will be considered and addressed through the EIA process, where relevant to the GHG emissions assessment. Local authorities will be contacted if additional matters are raised in the EIA

¹⁶⁵ Greenhouse Gas Protocol (2024) Standards and Guidance. Available at: <https://ghgprotocol.org/standards-guidance> [Accessed 24/01/2025].

¹⁶⁶ UK Government (2013) Construction 2025: strategy. Available at: <https://assets.publishing.service.gov.uk/media/5a7b7ea140f0b62826a03f2c/bis-13-955-construction-2025-industrial-strategy.pdf> [Accessed 24/01/2025].

¹⁶⁷ London Energy Transformation Initiative (2020) Embodied Carbon Primer. Available at: https://www.leti.uk/_files/ugd/252d09_8ceffcbcafdb43cf8a19ab9af5073b92.pdf [Accessed 24/01/2025].

¹⁶⁸ British Standards Institute (2023) PAS 2080: Carbon Management in Infrastructure and Buildings. Available at: <https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/pas-2080-carbon-management-in-infrastructure-and-built-environment/> [Accessed 24/01/2025].

¹⁶⁹ Royal Institution of Chartered Surveyors (2023) Whole life carbon assessment for the built environment. Available at: <https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment> [Accessed 24/01/2025]. This standard will be in force from July 2024.

¹⁷⁰ Institute of Environmental Management and Assessment (2020) Pathways to Net Zero: Using the IEMA GHG Management Hierarchy. Available at: <https://www.iema.net/learn/transition-to-net-zero/> [Accessed 24/01/2025].

¹⁷¹ British Standards Institute (2022) Sustainability of construction works. Sustainability assessment of civil engineering works. Calculation methods. Available at: <https://knowledge.bsigroup.com/products/sustainability-of-construction-works-sustainability-assessment-of-civil-engineering-works-calculation-methods?version=standard> [Accessed 24/01/2025].

Scoping Opinion.

Baseline Conditions and Receptors

Study area

6.5.6 The GHG assessment study area is defined by the Proposed Development Site boundary, as shown in Figure 1.1 (Appendix A) and covers all sources and sinks of GHG emissions associated with construction, operation, maintenance and decommissioning of the Proposed Development within the Proposed Development Site. It also includes relevant indirect emissions arising outside the Proposed Development Site boundary; for example, emissions embedded within the construction materials arising as a result of the energy used for their production; and energy consumption during operation of the Proposed Development.

6.5.7 The assessment of relevant indirect emissions will consider:

- upstream emissions: including those associated with the production and transport of fuels (primarily natural gas) and chemicals, and provision of water to the Proposed Development Site during operation; and
- downstream emissions: as described in paragraph 3.2.3, the residual CH₄ from the hydrogen output from the HPF is in the region of 0.1% by volume, therefore the downstream emissions associated with the combustion of hydrogen (and residual CH₄) produced by the Proposed Development are not expected to be material, considering the overall scale of emissions associated with the Proposed Development. This will be considered and confirmed in the ES. The assessment will also consider a proportionate approach to the emissions associated with the supporting CCS infrastructure into which the Proposed Development will connect, described in Section 3.2.

Existing Baseline

6.5.8 Aligning with IEMA (2022) guidance⁴², the baseline (do-minimum (DM) scenario) is the reference against which the impact of the Proposed Development will be compared and assessed. The DM scenario comprises the cumulative GHG emissions within the study area without implementation of the Proposed Development over the appraisal period.

6.5.9 The GHG baseline will be taken as the historic GHG emissions for the Proposed Development Site and a continuation of the current situation in which the Proposed Development is not delivered. This existing baseline includes emissions and/ or sequestration associated with existing habitats within the Proposed Development Site.

Future Baseline

- 6.5.10 The future baseline for the GHG assessment reflects a business-as-usual position whereby the Proposed Development is not implemented. This includes emission and/ or sequestration from land use within the Proposed Development Site.
- 6.5.11 The GHG emissions future baseline will take the form of a trajectory to 2050, therefore reflecting the historical baseline and the future baseline extended out to 2050.
- 6.5.12 The future baseline of the GHG Assessment does not seek to quantify alternative scenarios for production of equivalent energy within or beyond the Proposed Development Site. Consideration of this will be provided within the contextualisation exercise required to align with IEMA guidance and will also extend to consideration of the impact of potential future use of CCS in parallel with the Proposed Development.

Receptors

- 6.5.13 GHG emissions are not geographically limited. They have a global effect rather than directly affecting any specific local receptor to which a level of sensitivity can be assigned. The receptor for GHG emissions is the global atmosphere.

Potential Impacts

- 6.5.14 The Proposed Development has the potential to affect climate change (positively and negatively), during construction, operation and during decommissioning, due to the impact of GHG emissions arising directly and indirectly over the lifetime of the Proposed Development.
- 6.5.15 The aim of the Proposed Development is to provide domestically produced low carbon hydrogen which, through the use of CCS, will support the decarbonisation of local industrial users and wider UK net zero targets. A quantitative assessment of GHG emissions associated with the Proposed Development will be presented within the ES.
- 6.5.16 The potential sources of GHG emissions during construction, operation and decommissioning phases of the Proposed Development that will be considered in the GHG assessment are listed in **Table 6.25**.

Table 6.25: Potential sources of GHG emissions associated with the Proposed Development

Lifecycle sub-stages	Activity	Potential sources of GHG emissions
Product stage (A1-A3)	Raw material extraction and manufacturing of materials	Embodied GHG emissions associated with the required raw materials for construction of the Proposed Development.
Construction process stage A4: Transport impacts	Transportation of materials to site	GHG emissions from fuel consumption of vehicles used for transportation of materials to the Proposed Development Site.
	Transport of construction workers	GHG emissions from fuel consumption of vehicles used for transportation of workers to the Proposed Development Site.
	Disposal and transport of construction waste	GHG emissions from fuel consumption of vehicles used to transport waste.
Construction process stage A5: Installation process	On-site construction activities	GHG emissions from fuel/ energy consumption in construction processes such as diesel required to fuel construction machinery.
Use (B1)	Activities associated with hydrogen production, such as steam creation, natural gas input and catalyst for reaction	Volumes of natural gas, steam and catalyst used in operation.
Maintenance, repair and replacement (B2 – B4 ¹⁷²)	Routine maintenance, repair and replacement of components.	Energy consumption for operation and activities of routine maintenance including extraction, manufacture, transportation and installation energy use. Embodied carbon associated with materials used for repair and replacement activities. Possible flaring or venting during routine maintenance activities.
Operational energy use (B6)	Energy use associated with the HPF	Electricity consumption for HPF infrastructure.
Operational water use (B7)	Water used for direct and indirect heating and cooling	Emissions arising from the treatment and disposal of water used.
Deconstruction and demolition (C1)	Removal of internal elements and structures, deconstruction, dismantling, demolition	GHG emissions associated with the removal and dismantling of equipment at the end of life of the Proposed Development.

¹⁷² B5 Refurbishment is excluded as the Proposed Development is unlikely to change use over its lifetime.

Lifecycle sub-stages	Activity	Potential sources of GHG emissions
Transport (C2)	Transport of waste to landfill or processing centre	GHG emissions from fuel consumption of vehicles used at the end of life of the Proposed Development.
Waste processing and disposal (C3-4)	Waste treatment and disposal of discarded material at end of life	GHG emissions associated with landfill, incineration and energy from waste recovery at the end of life of the Proposed Development.
Benefits beyond the boundary - Land use change (D)	Changes to currently vegetated land.	Emissions associated with land use change, carbon sequestration potential in future years.
Benefits beyond the boundary – displacement of other energy sources (D)	Displacement of other energy sources with hydrogen	As part of the contextualisation of the assessment will look to quantify the benefit that may accrue from displacement of emissions associated with end users switching from other GHG emitting fuels to hydrogen.

Cumulative and in-combination impacts

- 6.5.17 IEMA GHG guidance (2022)⁴² states: *“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...Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other.”*
- 6.5.18 On this basis, cumulative impacts associated with other planned or consented development unconnected and unrelated to the Proposed Development will not be included in a cumulative assessment of impact under the GHG topic – these other projects are **Scoped Out** of the GHG assessment.
- 6.5.19 However, as the consented NZP T&S is necessary to the operation of the Proposed Development, the GHG emissions associated with the construction and operation of the NZP T&S will be assessed. The assessment will consider the totality of the emissions arising from the T&S and will also contextualise these in terms of the proportion of emissions that might be attributed to the Proposed Development on the basis of the T&S infrastructure being shared with others during operation.
- 6.5.20 Therefore, cumulative impacts relating to the NZP T&S are **Scoped In** to the GHG Assessment. As the T&S is a separately consented development, this assessment will be high level and utilise such information as is readily available (or use benchmarks where necessary) to determine estimated

emissions from the T&S system.

Embedded Mitigation

- 6.5.21 The Proposed Development throughout the detailed design phase will be designed, as far as practicable, to avoid and reduce impacts and effects on climate change through the process of design development, and by embedding measures into the Proposed Development design. In addition, how the Proposed Development is constructed, operated and maintained, and decommissioned would be appropriately controlled in order to manage and minimise potential environmental effects (required as a result of legislative requirements and/ or standard sectoral practices).
- 6.5.22 As per the NPS EN-1 requirement, the GHG ES Chapter will outline mitigation measures to reduce GHG emissions from the Proposed Development.
- 6.5.23 Opportunities to mitigate GHG emissions will be developed in line with the IEMA GHG Management Hierarchy¹⁷⁰ of “*Eliminate*”, “*Reduce*”, “*Substitute*” and “*Compensate*.” Mitigation measures may include, but would not be limited to, sourcing of local construction materials, selecting construction materials with lower embodied carbon, increased efficiency of construction plant and machinery, and use of renewable/ low carbon fuels for construction vehicles and machinery.
- 6.5.24 In terms of GHG emissions, it is envisaged that CTMP and CWMP will form part of the embedded mitigation framework as described in paragraph 3.3.12.
- 6.5.25 Mitigation measures during the operation of the Proposed Development will be driven by the environmental permit that will control operational emissions in accordance with the use of BAT. Any mitigation measures which are required during the decommissioning phase will be included within a DEMP to be developed at the required point.
- 6.5.26 GHG mitigation and enhancement measures resulting from the Proposed Development, as far as reasonably practicable, will be identified and presented in the ES.

Summary of Potential Likely Significant Effects

- 6.5.27 Table 6.26 provides a summary of the GHG elements that are proposed to be **Scoped In** and **Scoped Out** of the ES, along with justification for that decision.

Table 6.26: GHG emissions elements Scoped In or Scoped Out of future environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline(s)				
GHG Emissions	Construction	✓		Construction activities will result in GHG emissions
	Operation	✓		Operational activities will result in GHG emissions
	Decommissioning	✓		Decommissioning activities will result in GHG emissions

Proposed Assessment Methodology

Overview

- 6.5.28 The GHG assessment will follow a project lifecycle approach to calculate estimated GHG emissions arising from the construction, operation and maintenance phases of the Proposed Development and to identify GHG ‘hot spots’ (i.e. emissions sources likely to generate the largest amount of GHG emissions). This will enable the identification of priority areas for mitigation in line with the principles set out in IEMA guidance⁴². The GHG assessment will quantify and report the GHG emissions anticipated to be generated or avoided by the Proposed Development.
- 6.5.29 In line with the World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines¹⁶⁵, the GHG assessment will be reported as tonnes of carbon dioxide equivalent (tCO₂e) and will consider the seven Kyoto Protocol¹⁵⁵ gases:
- CO₂;
 - CH₄;
 - Nitrous oxide (N₂O);
 - Sulphur hexafluoride (SF₆);
 - Hydrofluorocarbons (HFC);
 - Perfluorocarbons (PFC); and
 - Nitrogen trifluoride (NF₃).
- 6.5.30 These GHG emissions will be broadly referred to in the GHG assessment ES chapter under an encompassing definition of ‘GHG emissions’, with the unit of tCO₂e or MtCO₂e, a single metric of the global warming potential of the main GHG emissions.
- 6.5.31 The temporal boundary for GHG assessment will align with the anticipated

development timescales set out in Section 3.4.1 using Rochdale Envelope principles to account for a potential later start to construction i.e.:

- phased construction, assuming an earliest commencement date for Phase 1 of 2027, and construction lasting approximately four years per train, with Phase 2 construction commencement following completion of Phase 1);
- an operational phase (assumed to be a 25 years for each phase, with the potential for an extended operating life beyond this);
- decommissioning phase (anticipated will take approximately two years from final plant operation); and
- the overall temporal boundary for the GHG assessment will therefore consider the earliest construction start date and latest decommissioning date (two years from final plant operation).

6.5.32 The methodology focuses on assessing the impact of the Proposed Development on GHG emissions by quantifying the GHG emissions arising from each lifecycle stage in the DM and do-something (DS) scenarios. Emissions associated with the Proposed Development will be compared to the baseline DM scenario to quantify the impact of the Proposed Development.

6.5.33 The GHG assessment will be carried out across the following lifecycle phases:

- Product stage (A1-3): GHG emissions associated with this stage are associated with the extraction and supply of raw materials, their transport to any manufacturing plant/ location, and any subsequent manufacturing process.
- Construction stage (A4-5): GHG emissions calculated for this stage are concerned with the transportation of materials to site, the energy consumed through construction plant use, water consumption in construction, the transportation and treatment of waste/ wastewater and employee transport.
- GHG emissions from fuel consumption during operation (both direct emissions to the atmosphere from the Proposed Development, and also indirect, upstream emissions from the natural gas, water, chemicals and other materials used in the hydrogen production process, and downstream emissions relating to the transport of the generated hydrogen).
- Use stage (B): Use stage GHG emissions refer to the emissions arising from operation of the built asset and the maintenance, repair and replacement of assets over its lifecycle, this includes the emissions associated with materials used in maintenance, transportation emissions of workers travelling to the Proposed Development and water consumption during operation.

- Decommissioning stage (C): emissions from the deconstruction and demolition of the Proposed Development, transport of equipment and vehicles to and from the Proposed Development, transport and processing emissions associated with landfill, incineration or energy from waste recovery.
- Benefits/ loads beyond the system boundary (D): GHG emissions from the construction and operation of the Proposed Development that affect the system. Emission sources may include those associated with land use change, for example GHG emissions as a result of the disturbance of soils and vegetation within the Proposed Development Site boundary; GHG benefit that may accrue from the displacement of emissions associated with end users switching from other GHG emitting fuels to hydrogen produced by the Proposed Development.

- 6.5.34 The Proposed Development is expected - in due course - to connect into an already consented carbon capture T&S system that would allow for the capture and storage of CO₂ arising from hydrogen production. The consented NZP T&S system beyond the CO₂ Export Connection Corridor (shown in Figure 3.1 – Appendix A) is outside the scope of this assessment. Consideration will be given to potential periods of unavailability of the T&S system.
- 6.5.35 As part of the contextualisation exercise as required by IEMA⁴², the assessment will discuss the scale of emissions arising from the Proposed Development when this is used in conjunction with CCS and where combustion of hydrogen displaces combustion of other fossil fuels.
- 6.5.36 The contextualisation exercise will also give consideration to the role of the Proposed Development in delivering on wider policy commitments relating to decarbonisation and delivery of the UK carbon budget.
- 6.5.37 Aligning with PAS 2080:2023 Carbon Management in infrastructure and buildings, IEMA guidance, BS EN 17472:2022 Sustainability of construction works and RICS Whole Life Carbon Assessment for the built environment, a summary of GHG emissions sources included within the lifecycle assessment informing this assessment can be found in Table 6.27¹⁷³.

¹⁷³ Where possible the GHG assessment will seek to use project-specific information. In the absence of details from the design team, the assessment will draw on other sources such as academic literature and industry publications.

Table 6.27: Summary of GHG emissions study area components within the GHG assessment

Project Work Stage	Lifecycle Stage	Description	Justification for inclusion and exclusion from the assessment	Data Sources used in Assessment (where included)
Pre-construction	A0	Preliminary studies, consultation	Excluded – GHG emissions from preliminary studies and works are largely office-based and are assumed to be insignificant.	N/A
Construction	A1-3	Supply of raw materials, transport and manufacturing of construction materials.	Included – embodied GHG emissions with the required construction materials.	Material quantities from design team.
	A4	Transport to works site	Included – GHG emissions associated with transportation of construction materials to and from the Proposed Development.	Assumed transportation distances from the design team.
	A5	Construction / installation processes	Included – GHG emissions associated with energy and fuel usage, construction waste and construction workers commuting to and from the Proposed Development.	Fuel usage during construction, electricity and water usage for site compounds. Construction staff and estimated commute frequency and distances. Waste quantities and assumed distance to disposal facilities.
	D	Land use change	Included – GHG emissions associated with land use change.	Type and area of land subject to change in usage versus the pre-Proposed Development baseline taken from Section 6.2: Biodiversity.

Project Work Stage	Lifecycle Stage	Description	Justification for inclusion and exclusion from the assessment	Data Sources used in Assessment (where included)
Operation	B1	Use	Included – GHG emissions arising in the production of H ₂ via the HPF, such as well to tank emissions of natural gas supply, and CO ₂ infrastructure.	Emissions associated with the HPF in hydrogen production.
	B2, B3 & B4	Maintenance, Repair & Replacement	Included – It is anticipated equipment will need maintaining and replacing over the lifetime of the Proposed Development. Includes possible flaring or venting during routine maintenance activities.	Typical replacement periods for key materials. Design team.
	B5	Refurbishment	Excluded – unlikely to change use over the lifetime of the Proposed Development.	N/A
	B6	Operational energy use	Included – It is anticipated large amounts of energy will be required for the HPF.	Energy used for HPF ¹⁷⁴
	B7	Operational water use	Included – There is potential for large amounts of water use within the HPF process (water reacts with natural gas to produce hydrogen and CO ₂).	Water used for HPF ¹⁷⁴
	B8	User utilisation of infrastructure	Excluded – emissions related to commuting of staff during operation of the	N/A

¹⁷⁴ Data likely to be taken from academic literature in the absence of details from the design team.

Project Work Stage	Lifecycle Stage	Description	Justification for inclusion and exclusion from the assessment	Data Sources used in Assessment (where included)
			Proposed Development is likely to be de minimis in the context of the wider development. Consideration will be given to use and efficiency of the on-site CCS infrastructure within the ES.	
	D	Ongoing land use emissions and sequestered	Included - GHG emissions associated with land use change.	Type and area of land subject to change in usage versus the pre-Proposed Development baseline taken from Section 6.2: Biodiversity
Decommissioning	C1	Deconstruction and Demolition	Included – There are anticipated GHG emissions associated with the removal and dismantling of equipment.	Data for the decommissioning phase will use the construction phase data as proxy values.
	C2	Transport	Included – GHG emissions associated with vehicles to and from the Proposed Development during the decommissioning phase are anticipated.	
	C3, C4	Waste processing and disposal	Included - GHG emissions associated with landfill, incineration and energy from waste recovery.	
	D	Land use change	Included – GHG emissions associated with land use change.	Type and area of land subject to change at decommissioning phase versus the

Project Work Stage	Lifecycle Stage	Description	Justification for inclusion and exclusion from the assessment	Data Sources used in Assessment (where included)
				pre-Proposed Development baseline, taken from Section 6.2: Biodiversity

6.5.38 As per section 6.5.20, the cumulative assessment will seek to quantify emissions associated with the NZP T&S.

Relevant Data Sources

6.5.39 Activity data will be gathered from project specific information available at the current design stage alongside publicly available industry benchmarks to provide an assessment of GHG emissions for the Proposed Development.

6.5.40 The main emissions factors used in the assessment will be from the following sources:

- Greenhouse Gas Reporting: Conversion Factors¹⁷⁵ (published annually);
- Inventory of Carbon and Energy (ICE) Database V3¹⁷⁶; and
- Valuation of energy use and GHG emissions for appraisal: supplementary guidance to the HM Treasury Green Book¹⁷⁷.

6.5.41 Where site-specific data sources are unavailable, a literature review will be undertaken for the range of processes and technologies within the Proposed Development to understand associated emissions.

Assessment Criteria

Sensitivity of Receptor

6.5.42 The sensitivity of the receptor (i.e. the global climate) to increases in GHG emissions is always defined as high as any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore

¹⁷⁵ UK Government (2023) Greenhouse Gas Reporting: Conversion Factors. Available at: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023> [Accessed 24/01/2025].

¹⁷⁶ Circular Ecology (2019) ICE Database V3. Available at: <https://circularecology.com/embodied-carbon-footprint-database.html> [Accessed 24/01/2025].

¹⁷⁷ UK Government (2023) Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Available at: <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal> [Accessed 24/01/2025].

meet its future 5-year carbon budgets. Also, the extreme importance of limiting global warming to below 2°C this century is broadly asserted by the International Paris Agreement and the climate science community.

Impacts

- 6.5.43 For the GHG emissions assessment, the magnitude of impact considers the output of the GHG quantification process, i.e. the Proposed Development's lifecycle GHG footprint, in the context of its contribution to the UK's carbon budgets and the possible impact of the Proposed Development on the UK meeting its net-zero target. Emissions from the Proposed Development will be contextualised against appropriate carbon budget periods to understand its relative contribution to climate change. Where appropriate, this will also be compared to industry specific carbon budgets, e.g. the carbon budget delivery plan. Further detail will be provided within the ES.
- 6.5.44 The UK Carbon Budgets considered relevant to the assessment are set out in Table 6.28, carbon budgets are currently available out to 2037, with the Seventh Carbon Budget expected in early 2025.

Table 6.28: Carbon Budget Periods relevant to this assessment

Carbon Budget & Period	Carbon Budget Limit	Reduction below 1990 levels
Fourth (2023 – 2027)	1,950 MtCO ₂ e	50% by 2025
Fifth (2028 – 2032)	1,725 MtCO ₂ e	68% by 2030*
Sixth (2033 – 2037)	965 MtCO ₂ e	78% by n
Seventh (2038 – 2042)	Expected early 2025 ¹⁷⁸	Expected early 2025 ¹⁷⁸
*Originally 57% when Fifth Carbon Budget was enshrined in law, has recently been increased to 68% as the UK's National Determined Contribution ahead of the United Nations' Conference of the Parties (26) (COP26) in November 2021 (BEIS, 2020) ¹⁷⁹ .		

Effects

- 6.5.45 The IEMA (2022) guidance⁴² states that *“when determining significance, any embedded/ committed mitigation measures that form part of the design should be considered.”* Therefore, the embedded mitigation within the design of the Proposed Development will be incorporated into the determination of significance.

¹⁷⁸ Climate Change Committee (2023) Proposed methodology for the Seventh Carbon Budget advice. Available at: <https://www.theccc.org.uk/publication/proposed-methodology-for-the-seventh-carbon-budget-advice/?chapter=1-introduction-to-carbon-budgets#1-introduction-to-carbon-budgets> [Accessed 24/01/2025].

¹⁷⁹ UK Government (2022) BEIS annual report and accounts. Available at: <https://www.gov.uk/government/publications/beis-annual-report-and-accounts-2021-to-2022> [Accessed 24/01/2025].

- 6.5.46 When evaluating the significance of the GHG emissions, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its design life, which may be positive, negative or negligible. The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of impact of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050. This is reflected in the IEMA guidance which describes five distinct levels of significance which are not solely based on whether a project emits GHG emissions alone, but how the project makes a relative contribution towards achieving a science-based 1.5°C aligned transition towards net zero.
- 6.5.47 A 'minor adverse' or 'negligible' i.e. non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral (i.e. zero on balance); but refers to the likelihood of avoiding severe climate change, aligning project emissions with a science-based 1.5°C compatible trajectory and achieving net zero by 2050.
- 6.5.48 A project's impact can shift from significant adverse to non-significant adverse effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero.

Assumptions, Limitations and Uncertainty

- 6.5.49 The GHG assessment will be undertaken using the recommended available information at the time of assessment. A reasonable worst-case scenario will be developed using appropriate industry benchmarks, and conservative assumptions on materials, design, assembly, earthworks, and the use of components to provide a robust assessment of likely carbon emissions.
- 6.5.50 At the time of writing, information on the decommissioning of the Proposed Development is unavailable. In the absence of decommissioning information at further assessment stages of the EIA, assumptions used for the construction phase of the Proposed Development will be used to estimate decommissioning emissions.
- 6.5.51 A full list of assumptions and limitations will be provided within the ES.

6.6 Ground Conditions

Overview

- 6.6.1 This Section sets out the proposed scope and methodology for assessment

of effects of the Proposed Development on Ground Conditions. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.

6.6.2 This section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report and is supported by the following figures (Appendix A – Volume II):

- Figure 6.6.1: Superficial Geology and Permitted Waste Sites;
- Figure 6.6.2: Solid Geology at Rockhead;
- Figure 6.6.3: Provisional Agricultural Land Classification; and
- Figure 16.4.1: Hydrological Constraints (WFD Waterbodies).

6.6.3 This section summarises the geological context and anticipated ground conditions at the Proposed Development Site, potential sources and receptors for contamination, geodiversity, and valuable soils supporting agriculture and ecologically important sites. Further information on surface water and groundwater receptors is presented in Section 6.14: Water Environment, with mineral resources discussed separately in Section 6.9: Material Assets and Waste. Assessment of ground stability is not considered as part of the EIA and will be addressed as appropriate as part of the engineering design.

Legislation and Policy and Guidance Context

6.6.4 The following legislation, policy and guidance will be considered in the ES:

- The Environmental Protection Act (1990)¹⁸⁰;
- The Environmental Damage Regulations (2015)¹⁸¹;
- The Water Resources Act (1991)¹⁸²;
- The EPR (2016)²³;
- The Overarching NPS for Energy (EN-1) (2024)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;

¹⁸⁰ UK Government (1990) Environmental Protection Act 1990.

¹⁸¹ UK Government (2015) The Environmental Damage (Prevention and Remediation) (England) Regulations 2015.

¹⁸² UK Government (1991) Water Resources Act 1991.

- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (2024)²⁷;
- PPG (2024)³⁵;
- The Local Plans for SBC (2019)³⁰ and RCBC (2018)³¹;
- The Environment Agency Land Contamination Risk Management (LCRM) guidance (2023)¹⁸³;
- Construction Industry Research and Information Association (CIRIA) Contaminated land risk assessment guidance (2001)¹⁸⁴;
- Design Manual for Roads and Bridges (DMRB) environmental impact assessment guidance (2020, 2019)^{185,186};
- Ministry of Agriculture, Fisheries and Food (MAFF) Agricultural Land Classification guidelines (1988)¹⁸⁷; and
- IEMA guidance on soil in environmental impact assessment (2022)¹⁸⁸.

Consultation

- 6.6.5 No engagement has been undertaken to date with respect to the scope or assessment methodology for this topic; it is proposed that this be agreed via the EIA Scoping Opinion request with SBC, RCBC, the Environment Agency and Natural England.
- 6.6.6 Following receipt, additional technical engagement will be undertaken with relevant consultees including SBC, RCBC and the Environment Agency to discuss baseline conditions. The aim of this will be to identify any known contamination issues or concerns not captured by the available information and that will need to be considered within the baseline conditions, impact assessment and mitigation sections.

¹⁸³ Environment Agency (2023) Land contamination risk management guidance. Available at: <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm> [Accessed 22/01/2025].

¹⁸⁴ Rudland, D.J., Lancefield, R.M, and Mayell, P.N. (2001) CIRIA C552: Contaminated land risk assessment – A guide to good practice. CIRIA, London.

¹⁸⁵ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges: LA 104 Environmental assessment and monitoring. Rev 1. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true> [Accessed 22/01/2025].

¹⁸⁶ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2019) Design Manual for Roads and Bridges: LA 109 Geology and soils. Rev 0. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/adca4c7d-4037-4907-b633-76eae30b9c0?inline=true> [Accessed 22/01/2025].

¹⁸⁷ Ministry of Agriculture, Fisheries and Food (1988) Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land. Available at: <https://publications.naturalengland.org.uk/publication/6257050620264448> [Accessed 22/01/2025].

¹⁸⁸ Institute of Environmental Management and Assessment (2022) A new perspective on land and soil in environmental impact assessment. Available at: https://www.iema.net/media/3xejdu0u/2022-iema_land_and_soils_guidance.pdf [Accessed 22/01/2025].

- 6.6.7 Where required, additional technical engagement with Natural England will be undertaken to agree the methodology for the assessment of impact on agricultural soils and soils supporting designated ecological sites, considering the design and proposed methods of construction of the Proposed Development, assessment findings and proposed mitigation measures.

Baseline Conditions and Receptors

Study area

- 6.6.8 The study area for the assessment of geology and contamination will comprise a 250 m buffer beyond the Proposed Development Site (Figure 6.3.1). A 250 m distance is routinely used within the UK to identify potential contamination risks (based upon historic landfill assessment guidance). Industry guidance does not provide a definitive study area for the assessment of Ground Conditions impacts, however, LA 109¹⁸⁶ identifies that the study area should be sufficient to allow any sources of contamination that could migrate and any sensitive receptors that could be affected by the Proposed Development to be appropriately identified. Based upon this, the typically used 250 m buffer has been considered for appropriateness considering the Proposed Development Site setting. Given the prevailing ground conditions (including typically significant thicknesses of low permeability drift that are likely to limit lateral migration), nature of the Proposed Development and baseline conditions (including proximity to watercourses), a 250 m study area is considered sufficient and appropriate to identify any potential contamination or ground gas that may be disturbed or mobilised by the works and receptors that could be impacted by the Proposed Development's interaction with the ground.
- 6.6.9 Due to the interface of the Proposed Development with soils within the construction footprint for the works, the Proposed Development Site boundary has been selected as the appropriate study area for the purposes of assessing impacts on soils.

Existing Baseline

Desk Study

- 6.6.10 The existing baseline has been established based upon a desk-based study, primarily using the following reports prepared for the Proposed Development:

- Arup Geo-environmental Constraints study (2022)¹⁸⁹ - prepared at optioneering stage for the Proposed Development and summarises a geo-environmental desk-based study for the existing CATS Terminal site and area of the Seal Sands, primarily to the east and north of the Terminal. It does not cover the area of the Hydrogen Pipeline (west) or Hydrogen Pipeline (east), east of Seal Sands Road to Wilton; and
- Arup Preliminary Ground Investigation: Geo-environmental Interpretative Report (2023)¹⁹⁰ - summarises the findings of preliminary intrusive GI carried out generally within the part of the proposed HPF Area in 2022/ 2023. No investigation was carried out for other areas of the Proposed Development Site.

6.6.11 Arup's previous knowledge of the local area from other projects and the following publicly available information have been used to supplement the baseline information in areas outside those covered by the above reports:

- BGS 1:50,000 digital geological web map service¹⁹¹;
- BGS 1:10,000 geological maps sheets NZ52NW¹⁹², NZ52SW¹⁹³ and NZ42SE¹⁹⁴;
- BGS 1:50,000 geological map sheets 33¹⁹⁵ and 34¹⁹⁶;
- Natural England citation for Teesmouth and Cleveland Coast SSSI¹⁹⁷;
- Local Plan Policies Maps for SBC (2019)³⁰ and RCBC (2018)³¹;
- Defra MAGIC website⁹⁴;
- Environment Agency Catchment Data Explorer¹⁹⁸;

¹⁸⁹ Arup (2022) Project H²NorthEast – Geo-environmental Constraints Study. Ref: 286378-ARP-XX-XX-RP-CG-0001 [Accessed 24/01/2025].

¹⁹⁰ Arup (2023) H²NorthEast – Preliminary Ground Investigation: Geo-environmental Interpretative Report. Ref: 286378-ARP-XX-XX-RP-CG-0008 [Accessed 24/01/2025].

¹⁹¹ British Geological Survey (n.d) BGS Geology 50K WMS. Available at: <https://www.bgs.ac.uk/technologies/web-map-services-wms/web-map-services-geology-50k/> [Accessed 22/01/2025].

¹⁹² British Geological Survey (2006) 1:10,000 Geology Series Sheet NZ52NW. Available at: <https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=17984761> [Accessed 22/01/2025].

¹⁹³ British Geological Survey (1990) 1:10,000 Series Sheet NZ52SW. Available at: <https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=12975304> [Accessed 22/01/2025].

¹⁹⁴ British Geological Survey (1992) 1:10,000 Series Sheet NZ42SE. Available at: <https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=12974049> [Accessed 22/01/2025].

¹⁹⁵ British Geological Survey (1987) 1:50,000 Series England and Wales Sheet 33 – Stockton. Available at: <https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=1001513> [Accessed 22/01/2025].

¹⁹⁶ British Geological Survey (1990) 1:50,000 Provisional Series England and Wales Sheet 34 – Guisborough. Available at: <https://largeimages.bgs.ac.uk/iip/mapsportal.html?id=1001514> [Accessed 22/01/2025].

¹⁹⁷ Natural England (2018) Teesmouth and Cleveland Coast SSSI citation. Available at: <https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000856.pdf> [Accessed 22/01/2025].

¹⁹⁸ Environment Agency (2023) Catchment Data Explorer. Available at: <https://environment.data.gov.uk/catchment-planning/> [Accessed 22/01/2025].

- Environment Agency Permitted Waste Sites Authorised Landfill dataset¹⁹⁹;
- Environment Agency Historical Landfill Sites dataset²⁰⁰;
- Provisional ALC grade dataset²⁰¹; and
- ALC Grades – Post 1988 Survey dataset²⁰².

6.6.12 Further site inspections and desk-based review of available information will be undertaken to supplement the above information as part of the assessments to inform the PEIR and ES.

Geological Context

6.6.13 The study area is indicated to be variably underlain by estuarine alluvium overlying glacial deposits, with localised alluvium and extensive areas made ground, as shown on Figure 6.3.1 (Appendix A). This is underlain by variable bedrock strata at rockhead as shown on Figure 6.3.2.

6.6.14 Based upon a high-level review of the available information, the superficial deposits are indicated as follows:

- Made ground is indicated extensively to either side of the River Tees. This made ground is understood to primarily be associated with reclamation of the estuary during the latter half of the twentieth century, primarily using hydraulic sands and slag rich materials from the local iron and steel industry. Made ground is also expected to be present across the majority of the study area associated with the extensive previous developments. Made ground is likely to be more localised in the far west where previous development has been limited but may be present locally (for example associated with infilling of any localised historic ponds, ditches or sand pits). Available information indicates the made ground on and around the Proposed Development Site to typically comprise granular materials with cohesive materials present locally. The made ground is indicated to variably include demolition materials, slag and ash and to range from thin to approximately 10 m in thickness. Landfill materials are also present within the study area.
- Estuarine alluvium is also indicated extensively across the centre of the Proposed Development Site beneath and to either side of the River

¹⁹⁹ Environment Agency (2024) Permitted Waste Sites Authorised Landfill Sites data set. Available at: <https://www.data.gov.uk/dataset/ad695596-d71d-4cbb-8e32-99108371c0ee/permitted-waste-sites-authorised-landfill-site-boundaries> [Accessed 22/01/2025].

²⁰⁰ Environment Agency (2024) Historic Landfill Sites dataset. Available at: <https://www.data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites> [Accessed 22/01/2025].

²⁰¹ Natural England (2023) Provisional Agricultural Land Classification Grade dataset. Available at: <https://www.data.gov.uk/dataset/952421ec-da63-4569-817d-4d6399df40a1/provisional-agricultural-land-classification-alc> [Accessed 22/01/2025].

²⁰² Natural England (2023) Agricultural Land Classification (ALC) Grades – Post 1988 Survey dataset. Available at: <https://www.data.gov.uk/dataset/c002ceea-d650-4408-b302-939e9b88eb0b/agricultural-land-classification-alc-grades-post-1988-survey-polygons> [Accessed 22/01/2025].

Tees. It is indicated to typically comprise variably silty sands and organic silty clays and to range from thin to approximately 25 m in thickness. An area of peat is indicated locally within the study area, immediately to the north of the Proposed Development Site boundary for the Hydrogen Pipeline (west). A very localised area of windblown sand is indicated in the east of the Proposed Development Site.

- Glacial deposits are anticipated to be present overlying bedrock in most areas of the Proposed Development Site, potentially thinning and being absent locally. These deposits are indicated to generally comprise glaciolacustrine deposits over glacial till with localised sands and gravels. The glaciolacustrine deposits are indicated to be absent in the Wilton area in the far east of the Proposed Development Site. Sand and gravel deposits are shown locally at the ground surface in the Cowpen Bewley area in the far west of the study area. The glacial deposits are indicated to typically comprise soft to stiff laminated clays over firm to very stiff variably sandy gravelly clays with localised sands and gravels, and to range from thin to 35 m (generally 5 m to 20 m) thickness. The base of the glacial deposits is indicated to be deepest beneath and to the west of the existing CATS Terminal, due to the presence of a buried valley.

6.6.15 Bedrock is indicated to be present at depths of typically between c. 5 m and 30 m, generally being shallowest towards the east of the study area. The presence of the buried valley results in rockhead locally being substantially deeper at approximately 44 m depth. The bedrock beneath the Proposed Development Site comprises a sequence of Jurassic and Triassic strata. The Redcar Mudstone Formation is indicated at rockhead in the east, overlying the thin Penarth Group, Mercia Mudstone (which is indicated at rockhead across the majority of the Proposed Development Site) and Sherwood Sandstone which is present at rockhead in the west. Permian strata are present at depth, including the Boulby Halite which is indicated to be present beneath most of the Proposed Development Site at approximately 300 m to 600 m depth. This deposit has historically been worked in the area via extraction through brine wells. The Saltholme fault is indicated to run approximately east-west through the west of the Proposed Development Site, downthrowing the bedrock to the north of the fault.

6.6.16 Shallow groundwater is typically indicated within the superficial deposits, which, in areas close to the River Tees, is understood to locally be tidally influenced. Perched water has been identified locally within the made ground. Where present, the glacial deposits appear to be acting as an aquiclude between the shallow and bedrock aquifers. Groundwater within the Sherwood Sandstone is understood to have locally been reported as subartesian.

Geodiversity Sites

- 6.6.17 The Proposed Development Site is partially situated within the Teesmouth and Cleveland Coast SSSI, which has been notified as a result of both its ecological and geological importance. The geological aspects of the designation relate to:
- Jurassic strata exposed in the foreshore between Redcar Rocks and Coatham Rock at Redcar, approximately 3 km north-east of the Proposed Development Site; and
 - Quaternary deposits exposed in the foreshore at Hartlepool, approximately 5 km to the north of the Proposed Development Site.
- 6.6.18 Neither of these areas are considered to be in close enough vicinity to the Proposed Development to be impacted by it. No designated local geological sites are indicated within the study area.

Potential Contamination Sources

- 6.6.19 Potential contamination sources have been identified, taking into account the filling and land uses that have been present in the study area and available GI information. This historical context of the study area and identified potential sources of contamination are briefly summarised below.

Historical context

- 6.6.20 Prior to the mid-nineteenth century, the study area is indicated to have been predominantly undeveloped, with most of the central area of the Proposed Development Site occupied by intertidal mud and sand flats associated with the River Tees estuary, including Seal Sands and Bran Sands. Farmland and marshland are indicated to have predominantly been present to the west and east of the estuary, with the village of Cowpen established in the west.
- 6.6.21 West of the River Tees, reclamation of land from the intertidal area is indicated to have commenced by the late nineteenth century. A few salt works and associated brine wells (extracting salt from halite deposits at depth, referred to in paragraph 6.6.15) and a rifle range were present at this time in the Saltholme area. Further expansion of saltworks is indicated to have occurred by the mid-twentieth century.
- 6.6.22 The majority of the former intertidal area had been reclaimed by the 1970s. This is understood to have been achieved through the construction of embankments to form cells and subsequent placement of hydraulic fill within the cells. Following reclamation, extensive industrial development occurred across the Seal Sands area progressively over the rest of the twentieth century. This included development of an oil refinery, various chemical works, a power plant and further expansion of the brine works. The existing

CATS Terminal natural gas processing plant was constructed on the site during the 1990s. The far west of the study area is understood to have remained predominantly undeveloped, except for construction of Cowpen Lane Industrial Estate and infrastructure construction. Five historic landfills operated within the study area to the west of the River Tees during the 1970s and 1980s, having variably been licensed to accept a range of inert and non-hazardous, commercial and industrial wastes, including construction and demolition wastes, incinerator residues and liquid wastes.

6.6.23 East of the River Tees, development had also commenced by the late nineteenth century, including a railway across the study area and presence of the Tees Slag Wool Works and associated spoil heaps to the south of the study area. By the mid-twentieth century, some reclamation of Bran Sands is indicated, with slag mounds indicated locally and the Redcar Iron and Steel Works to the north of the study area. Extensive land reclamation is identified by the 1980s, with expansion of the steel works and other industries including an oil refinery. The Wilton International chemical works is indicated to have been developed in the east of the Proposed Development Site over the second half of the twentieth century, including various polymer manufacture facilities. Three historic landfill sites operated within the study area to the east of the River Tees during the 1970s to 1990s, having variably been licensed to accept inert, industrial, commercial, household and liquid wastes. Three completed authorised landfill sites are also indicated within the study area, accepting industrial and special wastes.

6.6.24 Based upon the ground conditions and history of the study area, it is considered that several potential contamination sources could be present. These include:

- **General made ground:** Made ground is expected to be present extensively across the study area. Potential for contamination associated with the intrinsic nature and contamination status of fill materials placed during reclamation of the Proposed Development Site from the River Tees and site developments. For example, historic iron and steel works slag could be associated with a range of metals, inorganic compounds and variable pH. Demolition materials could be associated with contaminants including asbestos. Potential sources of ground gas could occur in any deep areas of organic fill materials.
- **Landfill sites:** A number of currently authorised and historically licensed landfill sites are indicated to be present within the study area. These provide the potential for variable forms and levels of soil contamination, contaminated leachate and landfill gas. The form and levels of contaminants and ground gas would be dependent on the composition of landfilled materials and extent and functionality of any leachate or gas control systems.

- **Potentially contaminative land uses:** Historical and recent potentially contaminative land uses within the study area include (but are not limited to) iron and steel works, natural gas and petroleum processing and storage sites, inorganic and organic chemical works, brine works, power station and electricity substations, and railways. These provide the potential for various forms of soil and groundwater contamination, particularly associated with any spills or leakage of tanks of raw materials, products or waste liquids, or on-site disposal of waste materials. The form and levels of contamination will depend on the actual on-site activities and the effectiveness of pollution controls in place.

6.6.25 Notwithstanding the identified potential for contamination, GI undertaken to date on the proposed HPF Area has encountered generally very low concentrations of contamination in soils and groundwater, except for low concentrations of asbestos associated with local demolition materials within made ground.

Potential Contamination Receptors

6.6.26 The following sensitive land uses, water resources and designated ecological receptors have been identified within the study area, which could act as receptors for contamination.

Land uses

6.6.27 The study area is located predominantly within an area of medium and low sensitivity land uses (as defined by LA109¹⁸⁶ and summarised in Table 6.30) with regard to human health; in the form of commercial and industrial land uses and associated infrastructure corridors. The following high and very high sensitivity land uses are, however, present locally:

- **Residential land uses:** Residential properties are present within close proximity to the Proposed Development Site (Hydrogen Pipeline (west) at Cowpen Bewley and Billingham). Residential properties are also present within the study area (close to the Hydrogen Pipeline (east)) at Dormanstown. As noted in paragraph 2.4.3 the nearest residential property to the proposed HPF Area is located approximately 2.1 km to the north-west at Marsh House Farm.
- **Schools:** The playing fields of Dormanstown Primary Academy extend into the east of the study area (outside of the Proposed Development Site boundary) close to the route of the Hydrogen Pipeline (east) (refer to Table 2.2).
- **No other schools** are indicated within the study area, with the nearest schools to the proposed HPF Area are Fens Primary School, St Peter's Catholic College, Bewley Primary School and St Michael's Catholic Academy, located approximately 4.3 - 4.7 km to the west and south-east of the proposed HPF Area. Dormanstown Primary Academy, Bewley Primary School and St Michael's Catholic Academy are located

(approximately 460 m – 600 m north-east, west and north-west of the Hydrogen Pipeline(s) refer to Table 2.2).

- **Public open space:** Areas of formal public open space including in Dormanstown residential estates, the grounds of Kirkleatham Museum and at Saltholme Nature Reserve are present within the study area. With the exception of RSPB Saltholme, these are located outside the Proposed Development Site boundary. Other areas of open space are present on within the study area and which are also publicly accessible for recreational use, including the Teesmouth NNR and Cowpen Bewley Woodland Park.

Designated ecological receptors

6.6.28 The study area is located in an area of several sensitive designated ecological receptors, as identified in Section 6.2: Biodiversity. These include the following designated sites which extend into the contamination study area:

- **Teesmouth and Cleveland Coast SSSI, SPA and Ramsar site** extends into both the study area and Proposed Development Site at several locations, in particular in the west. As explained in Section 6.2: Biodiversity, the site is designated in the study area as a result of nationally and internationally significant saltmarsh habitats, diverse bird assemblages and the presence of breeding harbour seals;
- **Teesmouth NNR** extends into the north of the study area at Seal Sands, locally immediately abutting the Proposed Development Site (north of the HPF Area). The site designated in the study area primarily as a result of the intertidal sand and mudflats and associated bird, seal and invertebrate populations;
- **Cowpen Bewley Woodland Country Park LNR and LWS** extends into the west of the study area (intersected by the Hydrogen Pipeline (west)); and
- **Eston Pumping Station LWS** is present within the study area (intersected by the Hydrogen Pipeline (east)).

Controlled waters

6.6.29 The study area is located within the catchment of the River Tees. The river's estuary flows south-north through the centre of the Proposed Development Site, widening into the intertidal flats area referred to as Seal Sands immediately to the north of the HPF Area. The estuary is classified as a heavily modified transitional water of moderate ecological status but failing chemical status.

6.6.30 Tributaries to the River Tees that are present within the study area include Dabholm Cut, which is present within the Proposed Development Site boundary to the east of the River Tees. This is understood to be fed by The Fleet and Ash Gill. Greatham Creek joins the west of Seal Sands within the

north-west corner of the study area. Several ponds and drainage ditches are present across the study area.

- 6.6.31 The study area is indicated not to fall within an area designated as either a surface water DWPA or DWSZ.
- 6.6.32 The bedrock beneath the study area comprises a Principal aquifer in the west (Sherwood Sandstone), a Secondary A aquifer in the centre (Mercia Mudstone) and a Secondary undifferentiated aquifer in the east (Penarth Group and Redcar Mudstone Formation). The overlying drift deposits are classified as primarily Secondary undifferentiated aquifers. Areas of Secondary A aquifer indicated locally where sands and gravels are indicated to be present at the surface, with unproductive strata identified in areas where glaciolacustrine deposits are indicated.
- 6.6.33 The study area is indicated not to fall within a SPZ. The nearest SPZ is located to the north-west of the study area around Hartlepool. Zone 3 of this SPZ (its total catchment) is indicated to be present approximately 3.8 km to the north-west of the Proposed Development Site. The study area is not indicated to be within a groundwater DWSZ.

Soils

- 6.6.34 Potentially valuable soils are present on the Proposed Development Site associated with the designated ecological sites described in paragraph 6.6.28 and agricultural land. The designated ecological sites which depend upon soils comprise the terrestrial elements of the Teesmouth and Cleveland Coast SSSI, SPA and Ramsar site and Teesmouth NNR. The National Soil Resources Institute (NSRI) Soilscape dataset (Defra, 2024) categorises the soils within these areas to generally comprise Class 21: *“loamy and clayey soils of coastal flats with naturally high groundwater”* with local areas in the west comprising Class 18: *“slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.”* The former soil type is indicated to be present widely around the Tees estuary area, however, its extent is likely to be restricted by the widespread presence of made ground in the area.
- 6.6.35 The agricultural land within the study area is indicated to generally have soils categorised as Class 18: *“slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.”* The Provisional ALC classification maps indicate the following grades of soil to be present within the study area, as shown on Figure 6.6.3 (Appendix A):
- **Urban soils:** indicated across much of the study area, correlating with the extensive history of development and made ground deposits indicated on the Proposed Development Site;

- **Non-agricultural soils:** indicated locally to the east of the River Tees. These are in an area that has previously been extensively infilled and developed;
- **Grade 5 (very poor quality) agricultural land:** indicated locally around the Hydrogen Pipeline (west), primarily in areas of grassland and wetland associated with the brineworks, saltmarsh and wetland areas and locally grassland around existing infrastructure corridors;
- **Grade 4 (poor quality) agricultural land:** indicated locally towards the west of the Proposed Development Site around in areas currently predominantly comprising grassland around existing infrastructure corridors and some agricultural land;
- **Grade 3 (good to moderate quality) agricultural land:** indicated in the far west of the Proposed Development Site around Cowpen Bewley in areas currently predominantly comprising agricultural fields and localised areas of woodland. Approximately 35.5ha of Grade 3 land is indicated within the Proposed Development Site boundary. Grade 3 soils can be divided through further study and investigation into Subgrade 3a (good) and Subgrade 3b (moderate) land. No records of previous ALC surveys in the immediate area have been identified to assist in determining the likely proportions of Grade 3a and 3b soils present on the Proposed Development Site; and
- **Grade 2 (good quality) agricultural land:** indicated along the edge of the study area in the far east. Approximately 4.4ha of Grade 2 land is indicated within the Proposed Development Site boundary, apparently associated with current arable land immediately adjacent to previously developed area.

6.6.36 Grade 1, 2 and 3a land is designated as best and most versatile (BMV) and is of high value. Based upon the above, there is potentially up to c. 40ha of BMV land within the Proposed Development Site. Based upon the nature of the Proposed Development in these areas, however, it is expected that the Proposed Development construction footprint and final development that will impact with BMV land will be substantially less than this. This is because, as stated in paragraph 2.2.15, at this early stage a broad corridor is included to allow for a degree of flexibility in the routing of the Hydrogen Pipeline(s). The actual width of disturbance along the Hydrogen Pipeline(s) corridor is likely to be substantially less than this following refinement of the Order Limits (prior to submission of the Application). Furthermore, the majority of the proposed footprint is also expected to be returned to agricultural use following construction.

Future Baseline

6.6.37 The geology and ground conditions are unlikely to change over time without a significant change of land use. However, natural attenuation processes

can mitigate risks over time where existing sources of contaminants are present within soil and groundwater. Changes in groundwater abstractions have the potential to affect groundwater flow regimes. Climate change could also influence the future baseline conditions e.g. due to changes in the rainfall regime, recharge rates, groundwater levels and flow. Such changes are long-term and not predictable at this stage.

- 6.6.38 Any future development within the study area will be subject to appropriate consenting regimes. These require consideration of the potential for contamination to be present and could therefore trigger the need for remediation strategies so that developments are suitable for their proposed uses. The potential for existing contaminant linkages to be broken therefore exists, although this is also difficult to predict.
- 6.6.39 Climate change has the potential to alter certain limiting physical factors within the ALC methodology, including soil wetness and soil droughtiness over the long-term.

Potential Impacts

- 6.6.40 This section identifies potential impacts in relation to the construction, operation and decommissioning of the Proposed Development.

Construction

- 6.6.41 Impacts will depend on the design (including any optionality retained) and construction methodology for the Proposed Development and will be confirmed in the ES that accompanies the Application. As stated in paragraph 3.3.5, earthworks including cut and fill will be required to provide a level development platform for the construction of the Proposed HPF Development. Localised earthworks may be required to remove obstructions or made ground materials within the development footprint and will be required to enable pipeline installation. Groundwater control is likely to be needed for pipeline construction and may also be needed locally for foundation/ substructure construction. Piled foundations will be required for the HPF and could feasibly be required locally for certain structures, for example if any crossings for above ground pipelines are required as stated in paragraphs 3.3.13 and 3.3.17.

Contamination

- 6.6.42 Available information for the HPF Area indicates generally relatively low levels of contamination, but with asbestos identified locally and the potential for unidentified contamination to be present locally associated with the industrial history of the area. As part of the proposed HPF construction, contamination could potentially be mobilised during construction as a result

of soils being exposed or disturbed by the groundworks and subsequent dust, runoff or leachate generation. Any localised groundwater contamination could potentially be mobilised laterally as a result of any dewatering activities required, although spread foundations are proposed to be kept high, where required, to minimise dewatering requirements. Piling or any ground improvement, if required, have the potential to create pathways for vertical migration of groundwater contamination.

6.6.43 Some of the proposed pipeline corridors pass through areas with a significant industrial history. Levels of contamination in these areas are not currently known but could potentially locally be significant. Open excavation works and, in particular, associated dewatering has the potential to mobilise contaminants.

6.6.44 Resulting impacts could include:

- harm to health of adjacent site users as a result of exposure to contaminated airborne dust or soils trafficked off site;
- pollution of surface water courses as a result of contaminated runoff or leaching and lateral migration of contamination from soils disturbed during the works;
- pollution of groundwater resources as a result of leaching of contamination and vertical migration of groundwater, particularly along pathways created by the works; and
- harm to health of ecological receptors as a result of airborne dust, contaminated run-off or leaching and groundwater migration.

6.6.45 On the basis of the above, contamination is **Scoped In** for the construction phase of both the HPF and Hydrogen Pipeline(s) and associated development components²⁰³.

Soils

6.6.46 The HPF Area is located in an area where urban soils are anticipated. No BMV land, or associated valuable agricultural soils, are present. On this basis, soils are **Scoped Out** for the construction phase for the HPF.

6.6.47 Valuable soils, potentially including soils from BMV land, could be impacted by construction activities along the Hydrogen Pipeline(s) construction corridor, including access routes, compounds and laydown areas. This could include loss of soils or their function as a result of processes such as removal, compaction, contamination, mixing or erosion. Given the potential for BMV land and the ongoing pipeline design and routing in these areas,

²⁰³ The term 'associated development components' is used along with the 'Hydrogen Pipeline(s)' in the 'Impacts' section from herein, to refer to other linear components of the Proposed Development such as the Effluent Connection Corridor and CO₂ Export Connection Corridor that are anticipated to give rise to similar impacts due to similar construction methods/ operational risks.

soils are **Scoped In** for the construction phase of the Hydrogen Pipeline(s) and associated development.

Operation

- 6.6.48 Impacts will depend on the design and operation of the Proposed Development, including any remediation strategy implemented, site drainage, site finishes and permanent land take.

Contamination

- 6.6.49 Contamination impacts during the operational phase are anticipated to be substantially reduced compared to during construction, particularly where remedial works have formed part of the design. Where this is the case, there is the potential that there may be a beneficial impact during the operation of the Proposed Development resulting from a reduction in overall contamination levels or breaking of contamination pathways. On this basis, contamination is **Scoped Out** for the operational phase for the HPF.
- 6.6.50 In other areas, such as pipeline construction, the potential for contamination pathways to be formed should also be able to be controlled during the operational phase through appropriate design and construction. On this basis, contamination is **Scoped Out** for the operational phase for the Hydrogen Pipeline(s) and associated development components.
- 6.6.51 For avoidance of doubt, the potential for future contamination of the ground associated with the operation of the HPF itself is also **Scoped Out**. This is because the HPF will require an Environmental Permit, and adherence to the EPR 2016 will be required so that any impacts of emissions to air, soil, surface and groundwater, to the environment and human health will be minimised and avoided using BAT as far as reasonably practicable, including through appropriate pollution prevention/ secondary containment measures and surface water management systems. This will include provision of (or updates to the existing CATS Terminal) Site Condition Report (SCR)/ relevant site protection and monitoring programme (SPMP) arrangements.

Soils

- 6.6.52 The impact on soils during the operational phase may involve the permanent loss or sealing, or physical impairment of valuable soils.
- 6.6.53 Based upon the indicated presence of urban soils on the HPF site, no BMV land, or associated valuable agricultural soils, are present. On this basis, soils are **Scoped Out** for the operation phase for the HPF.
- 6.6.54 For the pipelines, which locally cross land that is, or may potentially be classified as BMV land, the extent of impacts will be controlled by the

proposed design, extent of land required to accommodate this, and the quality soil management and reinstatement undertaken at construction stage. As explained in paragraph 3.3.20, the basis of design assumes that pipelines will be installed predominantly below ground, unless specifically required otherwise due to particular site constraints. Below ground pipelines are currently anticipated in areas of potential BMV land given that significant constraints (e.g. other pipework that would necessitate above ground construction) are not anticipated. This will enable reinstatement of soils following construction, allowing agricultural use to resume. On this basis, LSE are not expected and soils are **Scoped Out** for the operational phase. This will be reviewed as the design progresses and if any above ground pipelines are required that would result in the permanent loss of >5 ha of potential BMV land (refer to Table 6.31), any LSE would be reported in the ES.

Decommissioning

- 6.6.55 The impacts during decommissioning will depend on the final design for permanent works, the nature and extent of any remediation undertaken at construction stage and the form of proposed decommissioning.
- 6.6.56 It is assumed that decommissioning of the HPF will comprise the demolition of above ground structures, floors and pavements, and the removal of shallow foundations, pipelines and other utilities. It is assumed that any deep foundations will be left in situ. Such works would require ground works to be undertaken and may potentially require groundwater control in areas.
- 6.6.57 It is assumed that decommissioning of the HPF will comprise removal of pipelines and reinstatement of associated excavations with suitable fill materials.
- 6.6.58 Changes to baseline information that could happen in the intervening period would be addressed via a commitment to a DEMP, which would be secured via the draft DCO.

Contamination

- 6.6.59 During decommissioning of the HPF, contamination could potentially be disturbed or remobilised by earthworks required to enable removal of structures and infrastructure. Whilst potential impacts could in theory be similar to those identified for the construction phase above, in reality it is considered that the significance of these is likely to be substantially reduced and it should be possible to mitigate these through appropriate siteworks controls and design of mitigation measures. This is because, where remedial works have treated or removed contamination, the contamination risks will have reduced. Even where remedial works have not been

undertaken during construction, construction earthworks will have enabled the identification of any areas of residual contamination enabling appropriate construction and design mitigation measures to be implemented. On this basis, contamination is **Scoped Out** for the decommissioning phase for the HPF.

- 6.6.60 During decommissioning of the Hydrogen Pipeline(s) and associated development components, impacts are expected to potentially more closely mirror those at construction. This is because of the potential for migration of any contamination and the potential for this to be further mobilised through any dewatering works or backfill materials. On this basis, contamination is **Scoped In** for the decommissioning phase for the Hydrogen Pipeline(s) and associated development.

Soils

- 6.6.61 The impacts on soils during and after decommissioning are expected to be similar to those identified above at construction and operation.
- 6.6.62 Based upon the indicated presence of urban soils on the HPF Area, no BMV land, or associated valuable agricultural soils, are present. On this basis, soils are **Scoped Out** for the decommissioning phase for the HPF.
- 6.6.63 Valuable soils, potentially including soils from BMV land, could be impacted by decommissioning activities along the Hydrogen Pipeline(s) corridor, including access routes, compounds and laydown areas. This could include loss of soils or their function as a result of processes such as removal, compaction, contamination, mixing or erosion. Given the potential for BMV land and the ongoing design/ routing studies for the Hydrogen Pipeline(s), soils are **Scoped In** for the decommissioning phase.

Embedded Mitigation

- 6.6.64 The requirements for mitigation will be dependent on the Proposed Development design (including optionality retained) at the time of submission of the Application, the ground, contamination and soil conditions and assessment of the associated risks. Actual conditions will be confirmed prior to construction through an appropriate programme of development specific GI to inform detailed design; scoped to consider the geo-environmental and geotechnical risks relevant to the proposed works in each area of the Proposed Development Site.

Construction

- 6.6.65 Mitigation measures for the construction phase will be established and set out as part of the CEMP. A Framework CEMP will accompany the Application and set out good site practices and management measure to

limit the potential for dispersal and accidental releases of potential contaminants, soil derived dusts and uncontrolled runoff during construction. The Final CEMP will also establish procedures for dealing with unexpected soil and groundwater contamination. Submission, approval and implementation of the Final CEMP will be secured via a requirement of the draft DCO, as outlined in paragraph 3.6.5.

Contamination

- 6.6.66 The construction phase controls and mitigation for contamination will be established by the appointed contractor, based upon the actual form and level of contamination present on site. This will be determined prior to construction based upon the findings of the development specific GI, and evaluation of any residual uncertainty following the investigation. Risk assessments will be undertaken to confirm the construction phase risks. These will include (but not be limited to) assessment of the potential impacts of any dewatering on the migration of ground contamination.
- 6.6.67 A foundation works risk assessment will be undertaken to allow any piled foundations or penetrative ground improvement works to be appropriately designed and implemented to mitigate the potential for creation of migration pathways.
- 6.6.68 Where the contamination risk assessments identify unacceptable risks, remedial measures will be advised. Mitigation measures may include remediation of contamination prior to, or as part of, enabling works. It is envisaged that remedial measures are likely to include provision of clean surface cover. Localised removal or treatment of contaminated materials may also be advised where required. Other design measures that may be advised include the installation of low permeability barriers in pipeline corridors to restrict lateral migration of any significant contamination. They may also influence the use of particular piling or groundwater control methodologies and plant.
- 6.6.69 The CEMP will set out how contamination impacts are to be managed. Where re-use of soils on the Proposed Development Site is proposed, it will be subject to demonstrating their suitability for use such that no unacceptable risks arise. It is anticipated that reuse of soils on site will be undertaken in accordance with a Materials Management Plan (MMP), prepared in accordance with the CL:AIRE Definition of Waste code of practice²⁰⁴. Any unsuitable and/ or surplus soils will be appropriately

²⁰⁴ CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice (v2). London: CL:AIRE. Available at <https://www.claire.co.uk/component/phocadownload/category/8-initiatives?download=212:definition-of-waste-development-industry-code-of-practice> [Accessed 22/01/2025].

disposed of off-site to a suitably licensed facility.

Soils

- 6.6.70 The impacts on soils during construction will be mitigated through minimisation of construction footprints within areas of BMV and sensitive ecological sites, with micro-siting of compounds and laydown areas outside such areas as far as reasonably practicable. Where technically appropriate, pipelines will also be buried in such areas to enable appropriate reinstatement of soils over their footprint.
- 6.6.71 Soils will be managed and protected during the construction works in accordance with good practice, including the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009)²⁰⁵ and relevant British Standard (BS) for the use of soil on construction sites, which will be referenced in the CEMP. Soils will be restored following construction. Where possible, soils will be retained in their field/ area of origin. A soil restoration plan and statement will be prepared detailing the restoration approach and aftercare programme that is to be implemented.

Operation

Contamination

- 6.6.72 The mitigation of impacts during operation of the HPF will be achieved through appropriate design of the Proposed Development and adoption of an appropriate management system during the operation phase. For the HPF, this will include adherence to the Environmental Permit and monitoring site condition in accordance with the site protection and monitoring programme (SPMP), whilst for the Hydrogen Pipeline(s), operational and maintenance philosophy controls will verify the integrity of the pipeline.
- 6.6.73 No other operational effects are considered to require embedded mitigation beyond the design phase.

Decommissioning

Contamination

- 6.6.74 The mitigation of contamination impacts during and after decommissioning are expected to be similar to those identified for construction and operation phases above, however, will be dependent on the extent and form of any remediation already carried out.

²⁰⁵ Department for Environment, Food and Rural Affairs (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. London: Defra. Available at: <https://assets.publishing.service.gov.uk/media/5b2264ff40f0b634cfb50650/pb13298-code-of-practice-090910.pdf> [Accessed 22/01/2025].

- 6.6.75 The decommissioning strategy is currently designed to leave the pipeline in situ and only to remove the above ground facilities. Impacts will be controlled through a DEMP, secured through a requirement of the draft DCO.

Soils

- 6.6.76 The mitigation of impacts on soils during and after decommissioning are expected to be similar to those identified above at construction and operation and would be controlled through the DEMP.

Summary of Potential Likely Significant Effects

- 6.6.77 Table 6.29 provides a summary of the ground conditions elements that are proposed to be **Scoped In** or **Scoped Out** from the assessment, along with a justification for that decision.

Table 6.29: Ground Conditions elements scoped in or out of environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility				
Geodiversity	Construction Operation Decommissioning		✓ ✓ ✓	No geo-conservation or geodiversity sites present within the study area.
Contamination	Construction Operation Decommissioning	✓	✓ ✓	Extensive history of potentially contaminative land uses within immediate vicinity of Proposed Development. Sensitive receptors identified. Impacts during construction phase require assessment. Impacts during operation and decommissioning of the Proposed Development will be controlled via the Environmental Permit and regulated by the Environment Agency. It is therefore reasonable to assume no likely significant environmental effects during operation and decommissioning (site permit surrender) of the HPF.
Soils	Construction Operation Decommissioning		✓ ✓ ✓	Land within HPF Area classified as land in urban use. No impacts to BMV likely to occur.

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Pipeline(s) (and associated development components)				
Geodiversity	Construction Operation Decommissioning		✓ ✓ ✓	No geo-conservation or geodiversity sites present within the vicinity of the Proposed Development Site.
Contamination	Construction Operation Decommissioning	✓ ✓	✓	Extensive history of potentially contaminative land uses along proposed Hydrogen Pipeline routes. Sensitive receptors identified therefore construction impacts require assessment. Potential for contamination during operation of the Hydrogen Pipeline not likely to give rise to new significant effects given nature of hydrogen/ design specification for pipeline to meet integrity standards such as under the HSE Pipeline Safety Regulations (PSR), 1996. Potential for contamination impacts during decommissioning to be controlled via DEMP for above ground infrastructure but will be assessed in light of potential for pathway formation.
Soils	Construction Operation Decommissioning	✓ ✓	✓	Impacts on soils which may be BMV during construction and decommissioning phases feasible. No impacts on soils which may be BMV likely during operational phase.

Proposed Assessment Methodology

- 6.6.78 The assessment of impacts on ground conditions will be assessed in line with the process described in Highway England's LA 109: Geology and Soils (2019)¹⁸⁶. Whilst the proposed scheme is not a highway scheme, LA 109 presents the most comprehensive and authoritative current UK guidance on the assessment of ground conditions aspects in EIA. For the assessment of impact on soils, reference will also be made to the IEMA guidelines for land and soil in environmental impact assessment (2022)¹⁸⁸.

Contamination

- 6.6.79 Contamination or ground gas disturbed or otherwise mobilised by the Proposed Development could result in impacts on human health or the environment. Such impacts could occur as a result of contaminant linkages (source-pathway-receptor relationships) that may exist, be created or changed during either construction or post-construction (operation) phases of the project. Changes to existing and creation of new contaminant linkages could occur as a result of introduction of receptors, changes to contamination distribution, or creation or modification of exposure pathways.
- 6.6.80 The assessment will identify known and potential contamination and ground gas sources. The assessment will identify the sources based upon a desk-based review of information on the geological setting, ground conditions, and historical and recent land uses and recorded contamination incidents. The review will take into account the findings of GI available at the time of the assessment. At the time of scoping, preliminary GI has been carried out for the HPF Area. Further stages of GI are expected for the HPF Area and Hydrogen Pipeline prior to construction to enable detailed design. Where such information is available at the time the assessment is undertaken, this will be used to supplement the currently available baseline information.
- 6.6.81 For the purposes of the ES, the assessment will be desk-based and will consider potential receptors to contamination including site users, adjacent site users, controlled waters and designated ecological receptors. It is assumed that appropriate measures will be embedded within the design and construction methodology to mitigate impacts to construction materials within the Proposed Development and to manage risks to construction workers. These receptors will therefore not be considered as part of the assessment.
- 6.6.82 A two-stage assessment process will be undertaken for the identified potential sources of contamination:
1. The first stage will screen the identified potential sources of contamination to assess if the contamination could feasibly be disturbed or mobilised by the Proposed Development. This will consider the location of the source in relation to the proposed works, the nature of the works proposed in the vicinity of the source (including, for example, any earthworks, dewatering, piling or ground improvement), and the likely type and form of contaminants present.
 2. The second stage will assess the remaining potential contamination sources that have not been screened out at the first stage. The contamination risks at each stage of the Proposed Development (baseline, construction and operation) will be assessed by identifying

and qualitatively assess plausible contamination linkages in line with the Environment Agency LCRM online guidance (2023)¹⁸³ and CIRIA C552: Contaminated land risk assessment – A guide to good practice (2001)¹⁸⁴. Impacts will be identified by comparison of the construction and operational phase risks against the risks identified at baseline. Where identified, the significance of these will be assessed using the significance criteria set out in Table 6.32.

Soils

- 6.6.83 Impacts on soils could occur as a result of changes in land use or as a result of soil degradation through processes such as compaction, contamination, mixing or erosion. The assessment will consider such impacts on agriculture (including BMV land) and designated ecological receptors. Impacts in relation to other soil functions including carbon capture, archaeology or flood risk management are considered elsewhere within the EIA and are therefore not assessed specifically as part of the soils assessment.
- 6.6.84 The assessment of agricultural soils and soils supporting sensitive ecosystems will be assessed through a two-stage process:
1. The first stage will be to identify areas of sensitive or valuable soils within the Proposed Development Site boundary. This will be based upon publicly available datasets including the Natural England Provisional ALC grades²⁰¹, NE post-1988 surveys²⁰² and environmental designations (Section 6.2: Biodiversity). An initial screening exercise will be carried out to identify potential significance of impacts in accordance with the criteria in Table 6.30. This will take into account the extent of construction and operational footprint in each area of sensitive or valuable soils and associated areas of soil that could be affected. Where there is uncertainty in the actual sensitivity of soils present (for example within provisional ALC Grade 3, which may be either more sensitive Grade 3a or less sensitive Grade 3b), the most sensitive soil will be assumed to be present.
 2. Where a potentially significant impact is identified in the first stage, further assessment will be undertaken to enable soils to be appropriately characterised, impacts assessed, and mitigation measures identified, where required. The assessment will be undertaken in accordance with the MAFF ALC classification criteria¹⁸⁷ and IEMA 2022 guidance¹⁸⁸. In general, surveys are proposed to be carried out post-consent, to enable them to be targeted to final proposed pipeline alignments and inform development of the Soil Management Plan. As part of this stage, however, further technical engagement will be held with Natural England to agree the acceptability of this approach considering the assessment findings and proposed mitigation measures.

Assessment Criteria

- 6.6.85 The Ground Conditions criteria for assessment of receptor sensitivity, magnitude of impacts and significance of impacts are set out below.
- 6.6.86 Table 6.30 sets out the proposed receptor sensitivity in relation to contamination and soils. Criteria for contamination are based upon those set out within LA 109, supplemented by professional judgement. These consider relevant criteria on sensitivity of water receptors as set out in Highway England's LA 113: Road drainage and the water environment (2020)²⁰⁶. Criteria for soils are based upon those set out in the IEMA guidance.

Table 6.30: Ground Conditions sensitivity of receptors and descriptions

Sensitivity	Contamination receptors	Soils
Very High	Very high sensitivity land uses such as residential or allotments. EU designated ecological sites such as SAC, SPAs and Ramsar sites. Nationally significant surface watercourses with Q95 (flow which is exceeded 95% of the time) >1m³/s (cubic metres per second), with a Water Framework Directive (WFD) classification in a river basin management plan (RBMP) and/or comprising part of an EU or UK designated site. Principal aquifers providing regionally important resource or SPZ 1.	ALC Grades 1 and 2. Soils supporting EU designated ecological sites such as SAC, SPA and Ramsar sites. Peat soils. Soils with potential for ecological/ landscape restoration.
High	High sensitivity land uses such as public open space. UK designated ecological sites such as SSSI or National Landscape Areas (formerly Area(s) of Outstanding National Beauty (AONB)). Locally significant surface watercourses with Q95 <1m³/s, with a WFD classification in a RBMP and/or providing a habitat for species protected under EU or UK legislation. Principal aquifers providing locally important resource, SPZ 2 or supporting a river ecosystem.	ALC Grade 3a. Soils supporting UK designated ecological sites such as SSSI or National Landscape Areas (former AONB). Organo-mineral soils such as peaty soils.
Medium	Medium sensitivity land uses such as commercial or industrial. Non-statutory designated ecological sites such as LNR or LWS.	ALC Grade 3b. Soils supporting non-statutory designated ecological sites such as LNR or LWS.

²⁰⁶ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges: LA 113 Road drainage and the water environment, Design Manual for Roads and Bridges. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/d6388f5f-2694-4986-ac46-b17b62c21727?inline=true> [Accessed 22/01/2025].

Sensitivity	Contamination receptors	Soils
	Surface watercourses with Q95 >0.001m ³ /s, with no WFD classification in a RBMP. Principal or Secondary aquifer providing water for agricultural or industrial use, SPZ 3 and with limited connection to surface water.	
Low	Low sensitivity land uses such as highways and rail. Non-designated notable or priority habitats. Surface watercourses with Q95 <0.001m ³ /s, with no WFD classification in a RBMP. Secondary aquifer not providing water supply, not within an SPZ and with limited connection to surface water.	ALC Grade 4 and 5 or Urban soils. Soils supporting valued features within non-designated notable or priority habitats or landscapes, and agricultural soils. Mineral soils.
Negligible	Undeveloped surplus land/ no sensitive land use proposed. No notable or priority habitats. Unproductive strata.	As for Low sensitivity but with only indirect, tenuous and unproven links between sources of impact and soil functions.

6.6.87 Table 6.31 sets out the proposed criteria for assessing magnitude of impacts. The contamination criteria are based upon LA 109 and LA 113, amended using professional judgement taking into account experience of EIA on other projects and terminology as identified in Section 5.1. Criteria for soils are based upon criteria as set out in the IEMA guidance but take into account recommendations for areas of impacted soil less than 1ha as set out in LA 109. In determining the magnitude of impact, the resilience of soils to structural damage as a result of disturbance and handling will be considered.

Table 6.31 Ground Conditions magnitude of impact

Magnitude	Contamination	Soils
High	Change in contaminant linkages sufficient to result in risk of significant harm to human health requiring control/remediation measures. Failure of relevant Environmental Quality Standards (EQS). Loss of regionally important water supply as a result of water pollution. Reduction in water body WFD classification. Loss or extensive change to designated site. Remediation resulting in substantial reduction of risks to health. Removal of existing polluting discharge. Improvement in water body WFD classification. Substantial improvement to condition of designated site.	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 20ha. Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20ha.
Medium	Change in contaminant linkages sufficient to result in risk of harm to human health requiring control/ remediation measures. Degradation of regionally important water supply or loss of	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land

Magnitude	Contamination	Soils
	important commercial/industrial/ agricultural supplies as a result of water pollution. Contribution to a reduction in water body WFD classification. Measurable deterioration to condition of designated site. Remediation contributing to reduction in risks to health. Contribution to improvement in water body WFD classification. Measurable improvement to condition of designated site.	quality downgrading) over an area of 5ha to 20ha. Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 5ha to 20ha.
Low	Change in contaminant linkages sufficient to result in low risk to human health requiring only best practice measures. Minor effects on surface water, groundwater quality or condition of designated site. Remediation resulting in minor improvement to water quality or of condition of localised area of designated site.	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading) over an area of less than 5ha. Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5ha.
Negligible	Negligible to minor change to contaminant linkages or contaminant conditions, which are unlikely to discernibly change contamination risks from those assessed at baseline. Change to contaminant linkages resulting in very low to negligible risk to human health with no requirement for control measures. No measurable effects on surface water or groundwater quality.	No discernible loss or reduction, or improvement, of soil function(s) that restrict current or approved future use.
No change	No change to contaminant linkages or contamination conditions. No effect on health, surface water or groundwater quality, or designated sites.	No loss or reduction, or improvement, of soil function(s) that restrict current or approved future use.

6.6.88 The significance of effects will be assessed as set out in Table 6.32. This considers the approach adopted in Highway England's LA 104: Environmental assessment and monitoring¹⁸⁵ but with terminology as defined in Section 5.1. Where the table includes two significance criteria, professional judgement will be used to determine a single significance category, supported by the available evidence. Likely effects will be considered to be significant where they are moderate or above.

Table 6.32 Significance matrix for the assessment of Ground Conditions

		Magnitude of impact				
		No change	Negligible	Low	Medium	High
Environmental sensitivity / value	Very high	Neutral	Minor	Moderate or Major	Major	Major
	High	Neutral	Minor	Minor or Moderate	Moderate or Major	Major
	Medium	Neutral	Negligible or Minor	Minor	Moderate	Moderate or Major
	Low	Neutral	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
	Negligible	Neutral	Negligible	Negligible	Neutral or Minor	Minor

Assumptions, Limitations and Uncertainties

- 6.6.89 There is limited design information availability at the time of writing this EIA Scoping Report. The assessment within the ES will therefore be in-line with the latest design information available at the time of submission. Where design information is unknown or unavailable, conservative or worst-case assumptions will be made.
- 6.6.90 The assessment is to be undertaken based upon available existing information. There is the potential that actual ground and contamination conditions may vary from those indicated.

6.7 Landscape and Visual Amenity

Overview

- 6.7.1 This section sets out the proposed approach and methodology for the Landscape and Visual amenity Impact assessment (LVIA). The LVIA considers the potential for LSE on the landscape²⁰⁷ and visual²⁰⁸ resource to arise as a result of the Proposed Development.
- 6.7.2 This section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report and is supported by the following figures (in Appendix A – Volume II) and appendix:

²⁰⁷ Landscape effects relate to changes to the landscape as a resource, including physical changes to the fabric or individual elements of the landscape, its aesthetic or perceptual qualities, and landscape character.

²⁰⁸ Visual effects relate to changes to existing views of identified visual receptors ('people'), from the loss or addition of landscape features within their view due to the Proposed Development

- Figure 6.7.1: Zone of Theoretical Visibility – Digital Terrain Model (DTM) that represents a worst-case bare earth scenario and excludes existing features;
- Figure 6.7.2: Zone of Theoretical Visibility – Digital Surface Model (DSM) that includes existing buildings and woodland and representative viewpoint locations;
- Figure 6.7.3: Landscape Character;
- Figure 6.7.4: Photos from Representative Viewpoints; and
- Appendix G: Landscape and Visual Impact Assessment Methodology.

Legislation, Policy and Guidance Context

6.7.3 This legislation, policy and good practice guidance that is relevant to landscape and visual matters and which will be considered within the LVIA includes:

- European Landscape Convention (2012)²⁰⁹;
- Overarching NPS for Energy (EN-1) (2024)²⁶;
- NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (2024)²⁷;
- SBC Local Plan (2019)³⁰;
 - Policy SD5: Natural, Built and Historic Environment,
 - Policy SD8: Sustainable Design Principles,
 - Policy ENV2: Renewable and Low Carbon Energy Generation,
 - Policy ENV6: Green Infrastructure, Open Space, Green Wedges and Agricultural Land;
- RCBC Local Plan (2018)³¹;
 - Policy N1: Landscape,
 - Policy SD4: General Development Principles;

²⁰⁹ European Council (2012) European Landscape Convention.

- UK Government: Nationally Significant Infrastructure Projects: Advice on Good Design (2024)²¹⁰;
- An Approach to Landscape Character Assessment (2014)²¹¹;
- Guidelines for Landscape and Visual Impact Assessment, third edition (GLVIA3) (2024)²¹²;
- Assessing landscape value outside national designations, Technical Guidance Note 02/21²¹³;
- Visual Representation of Development Proposals, Technical Guidance Note 06/19 (2019)²¹⁴;
- The PPG: Natural environment (2024)²¹⁵; and
- Infrastructure, Technical Guidance Note 04/2020 (2020)²¹⁶.

Consultation

- 6.7.4 No engagement has been undertaken to date with respect to the scope or assessment methodology for this topic; it is proposed that this be agreed via the EIA Scoping Opinion request.
- 6.7.5 Following receipt, additional technical engagement will be undertaken with relevant consultees including RCBC and SBC to address any comments raised in the EIA Scoping Opinion, and to agree the final viewpoints for the ES.

²¹⁰ UK Government (2024) Nationally Significant Infrastructure Projects: Advice on Good Design. Available at: <https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design> [Accessed 23/01/2025].

²¹¹ 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 23/01/2025].

²¹² Landscape Institute (2024) 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 23/01/2025].

²¹³ Landscape Institute (2021) Assessing landscape value outside national designations, Technical Guidance Note. Available at: <https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2021/05/tgn-02-21-assessing-landscape-value-outside-national-designations.pdf> [Accessed 23/01/2025].

²¹⁴ Landscape Institute (2019) Visual Representation of Development Proposals, Technical Guidance Note. Available at: https://www.n-somerset.gov.uk/sites/default/files/2022-05/E2%20-%20%20LI_TGN-06-19_Visual_Representation.pdf [Accessed 23/01/2025].

²¹⁵ Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities (2024) National Planning Practice Guidance: Natural Environment. Available at: <https://www.gov.uk/guidance/natural-environment> [Accessed 23/01/2025].

²¹⁶ Landscape Institute (2020) Infrastructure, Technical Guidance Note 04/2020. Available at: <https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2018/01/LI-Infrastructure-TGN-FINAL-200924.pdf> [Accessed 23/01/2025].

Baseline Conditions and Receptors

Study area

- 6.7.6 The landscape and visual study area includes all land within the Proposed Development Site and the area within which the Proposed Development could potentially give rise to significant landscape and visual effects. This is illustrated in Figure 6.7.1 (Appendix A).
- 6.7.7 The proposed study area for the LVIA will be 2 km from the Proposed Development Site. This is defined based on professional judgement and experience of assessing similar schemes and contexts, and similar development in the local area and by initial analysis of the landscape and visual context within an area of search of approximately 10 km from the Proposed Development Site. Zone of theoretical visibility (ZTV) mapping (see Figure 6.7.1 and Figure 6.7.2 - Appendix A) illustrates the areas of potential intervisibility with the Proposed Development, specifically a flare stack of up to 110 m AGL. Fieldwork carried out in March 2024 and further desk study showed that the local landscape has a homogenous industrial character and views towards the Proposed Development Site from the surrounding area are already strongly characterised by similar built form to that which is proposed within the HPF Area of the Proposed Development Site. Existing built form, vegetation and superficial landforms were also noted as limiting views of lower built form beyond 2 km from the Proposed Development Site.

Data Sources

- 6.7.8 The data sources which have been reviewed to determine the baseline conditions include:
- NCA profiles²¹⁷;
 - Seascape Character Assessment for the North East Inshore and Offshore marine plan areas;²¹⁸
 - Stockton on Tees Landscape Character Assessment²¹⁹;

²¹⁷ Natural England (2014) National Character Area profiles. Available at: <https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles> [Accessed 23/01/2025].

²¹⁸ Marine Management Organisation (2018) MMO 1134: Seascape Character Assessment for the North East Inshore and Offshore marine plan areas. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/750226/North_East_-_Seascape_character_assessment_report.pdf [Accessed 23/01/2025].

²¹⁹ Stockton on Tees Borough Council (2011) Landscape Character Assessment. Available at: https://stockton.gov.uk/media/3151/Landscape-Character-Assessment-Report-with-appendices/pdf/Landscape_Character_Assessment_Report_with_appendices.pdf?m=1653399655987 [Accessed 23/01/2025].

- Stockton-on-Tees Landscape Capacity Study²²⁰;
- Redcar and Cleveland Landscape Character Assessment²²¹;
- OS raster mapping and aerial imagery; and
- ZTV mapping prepared by Arup using ESRI ArcMap.

Existing Landscape Baseline

6.7.9 The landscape receptors likely to experience changes as a result of the construction and/ or operation of the Proposed Development are considered to be the landscape character areas (LCA) in which the Proposed Development Site falls within or immediately adjacent to, and the landscape features and character of the Proposed Development Site itself. The following landscape receptors have therefore been identified:

- NCA 23: Tees Lowlands;
- LCA East Billingham to Teesmouth; and
- physical landscape features and overall character of the Proposed Development Site.

National character areas

6.7.10 Natural England has divided England into 159 NCA profiles, recognising the combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity that make places distinctive.

6.7.11 At a national level, the Proposed Development Site is located within NCA 23: Tees Lowlands which is generally characterised by broad, open plain dominated by the meandering lower reaches of the River Tees and its tributaries, with wide views to distant hills. The large conurbation around the Lower Tees and Teesmouth contrasts with the rural area to the south and west, which is largely agricultural in character. There is also a mosaic of intertidal and wetland habitats within the Tees Estuary internationally designated as Teesmouth and Cleveland Coast SPA and Ramsar site, and early successional grasslands and scrub have also emerged on previously developed land. The industrial installations in the estuary form a dramatic skyline when viewed from the surrounding hills.

²²⁰ Stockton on Tees Borough Council (2011) Landscape Capacity Study. Available at: https://stockton.gov.uk/media/3153/Stockton-Landscape-Capacity-Study/pdf/Stockton_Landscape_Capacity_Study.pdf?m=1649148547823 [Accessed 23/01/2025].

²²¹ Redcar & Cleveland Borough Council (2006) Redcar & Cleveland Landscape Character Assessment. Available at: <https://www.redcar-cleveland.gov.uk/sites/default/files/2022-04/Landscape%20Character%20Assessment%20%282006%29.pdf> [Accessed 23/01/2025].

Local landscape character areas

- 6.7.12 The landscape character assessment of Stockton-on-Tees was last reviewed in 2011 and so precedes the current Natural England guidance²¹¹ but is still considered to be a fair reflection of the prevailing landscape character. As shown on Figure 6.7.3 (Appendix A), the Proposed Development Site falls almost entirely within the East Billingham to Teesmouth LCA. A small part of the eastern leg runs through the Wilton Works industrial area, which falls within the remit of the Redcar and Cleveland Landscape Character Assessment²²².
- 6.7.13 The key characteristics for the East Billingham to Teesmouth LCA are given as:
- *“Industrial landscape fringing Billingham integrated with large areas of open space including wetlands and reclaimed semi-improved pasture;*
 - *Farmland is open and flat with minimal landscape features;*
 - *Industry dominates area to the east along the River Tees;*
 - *Open space within industrial areas contain significant wildlife value with a number of ecological designations present including Sites of Special Scientific Interest (SSSI’s), Site of Nature Conservation Importance (SNCI), Special Protection Area (SPA), Ramsar Site and Teesmouth National Nature Reserve;*
 - *Important ‘ridge and furrow’ within the field pattern around the settlement of Cowpen Bewley;*
 - *The Stockton to Hartlepool railway line is notable feature within the landscape, dividing the Landscape Character Area between estuarine and non-estuarine/rural fringe influences; and*
 - *Cowpen Bewley Woodland Park provides the only wooded element within this Landscape Character Area.”*
- 6.7.14 The condition of the East Billingham to Teesmouth Character Area is also noted as ranging from excellent where wetland habitats are successfully managed for their ecological resource, to poor where the landscape is devoid of natural features and dominated by industrial features and hardstanding.
- 6.7.15 The associated Landscape Capacity Study²²³ identifies the HPF Area as

²²² The study area of the Redcar and Cleveland Landscape Character Assessment was focused on the rural parts of the Borough so the character of the part of the Proposed Development Site is not recorded within any published character assessment. Available at: <https://www.redcar-cleveland.gov.uk/sites/default/files/2022-04/Landscape%20Character%20Assessment%20%282006%29.pdf> [Accessed 24/01/2025].

²²³ As noted at paragraph 5.41 of GLVIA3²¹², landscape sensitivity and capacity studies ‘cannot provide a substitute for the individual assessment of the susceptibility of the receptors in relation to change arising from the specific development proposals.’

having a Very High Landscape Capacity. The Hydrogen Pipeline (east) passes through areas of Medium and Very High Landscape Capacity, whilst the Hydrogen Pipeline (west) passes through areas of Very Low and Medium Landscape Capacity.

Seascape Character Assessment for the North East Inshore and Offshore marine plan areas

- 6.7.16 At a regional level, the Proposed Development Site is located in proximity to Marine Character Area (MCA) 22: Tyne, Tees and Wear Estuaries and Coastal Waters which is generally characterised by shelving coastal waters off the extensively developed coast, deepening to approximately 30-50 m offshore and encompassing the estuaries and tidal rivers inland.

Physical landscape features and overall character of the Site

- 6.7.17 The Proposed Development Site character is fairly consistent and predominantly characterised by a flat expanse of wet meadows with scattered scrub but also contains large areas of industrial plant and hardstanding. Existing above-ground pipelines and private access roads traverse much of the Proposed Development Site which segments the landscape into smaller, irregular-shaped areas. The existing CATS Terminal contains a concentration of tall process plant (vessels, columns, piperacks, boiler stacks and flare stacks) and associated built infrastructure. The perceptual qualities of the Proposed Development Site are also heavily influenced by adjacent industrial development of a similar character.
- 6.7.18 The Hydrogen Pipeline (east) is intersected by the River Tees, the Tees Valley Rail Line and the A1085 which provide access to the adjacent port and docklands. A large part of the Hydrogen Pipeline (east) extent is defined by the Wilton International complex industrial estate which includes various warehouse-style buildings, tall stacks, above ground pipelines, bridge and access roads.
- 6.7.19 The Hydrogen Pipeline (west) is intersected by the A178 and contains more industrial fringe uses such as a pumping station and related pipelines around the Seal Sands Roundabout. The western extent of the Proposed Development Site also coincides with the small, linear village of Cowpen Bewley which is characterised by two-storey, detached properties or short terraces, set back from the road, and surrounded by woodland and farmland to the north and south respectively.
- 6.7.20 The Proposed Development Site is not located within a nationally designated area, such as a National Park or National Landscape and is not covered by any local designation that identifies landscape value. The

Proposed Development Site does not demonstrate evidence of landscape qualities that would elevate it above everyday landscapes and so it is considered that the Proposed Development Site does not constitute a valued landscape in the context of NPPF²⁷, paragraph 187.

Existing Visual Amenity Baseline

Extent of visibility

- 6.7.21 ZTV mapping presented at Figure 6.7.1 and Figure 6.7.2 has been used to identify visual receptors and locate the representative viewpoints. The initial ZTV (Figure 6.7.1) is based on bare earth and indicates the potential for substantial visibility of an up to 110 m structure in all directions up to 10 km from the Proposed Development Site. The primary area where visibility would be limited is from within the North York Moors approximately 11 km south-east of the HPF Area where the landform is more pronounced.
- 6.7.22 The ZTV taking into account existing built form and vegetation (Figure 6.7.2) shows a more refined viewshed which is more reflective of the actual visibility experienced during fieldwork. There is theoretical visibility in the north from within Hartlepool Bay up to the edge of Croft on Heugh (approximately 10 km distant). There are also closer distance glimpses at the southern edge of Seaton Carew as well as from the northern part of Teesmouth NNR and South Gare Breakwater within 5 km of the Proposed Development Site. From the east, there are many slithers of theoretical visibility within the 2 km study area indicating glimpsed views between existing industrial development. The principal area of theoretical visibility in the south is from Eston Moor within the North York Moors National Park, whilst dense residential development in and around Middlesbrough prevents mid distance views. Similarly, from the west, development on the outer fringes of Middlesbrough restricts theoretical visibility beyond, with the principal areas being the open wetland areas around Salholme and Cowpen Marsh. The ZTV also shows scattered areas of theoretical visibility from farmland on the western edge of Hartlepool and beyond the A689.
- 6.7.23 Neither of the ZTVs account for the acuity of the eye or smaller areas of vegetation.

Visual receptors and representative viewpoints

- 6.7.24 Visual receptors likely to experience views of the construction and/ or operation of the Proposed Development can be categorised into the following types:
- motorists along major highways (A178, A1185, A1085);

- motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane);
- recreational users of the King Charles III England Coast Path between Hartlepool and Redcar;
- recreational users of National Cycle Network (NCN) Route 14 around Hartlepool Bay;
- recreational users of NCN Route 65 around Middlesborough Dock;
- residents at the eastern edge of Hartlepool;
- residents at the northern edge of Middlesborough;
- visitors to Teesmouth NNR;
- visitors to Saltholme Nature Reserve;
- visitors to Cowpen Bewley Woodland Park;
- visitors to the Teesdale Way Viewpoint along the South Gare Breakwater;
- visitors to the River Tees Viewpoint along the southern riverside; and
- visitors to the Eston Beacon within the North York Moors National Park.

6.7.25 Table 6.33 below describes the existing baseline for these visual receptors and representative viewpoints. The location of the proposed representative viewpoints is shown on Figure 6.7.2 and scoping photography from each location is provided at Figure 6.7.4 (Sheets 1 – 13). These have been selected to cover a range of close, mid and long-range views from the different receptor groups. It is anticipated that the EIA Scoping Opinion and subsequent technical engagement will be used to agree these viewpoints.

Table 6.33: Visual receptor baseline

Visual Receptor	Representative viewpoints (Figure 6.7.2)	Baseline description
Motorists along major highways between Hartlepool and Redcar (A178, A1185, A1085)	J - Within the Proposed Development Site (Hydrogen Pipeline (west)) <i>Refer to sheet 10 of Figure 6.7.4</i> K 500 m to the north of the Hydrogen Pipeline (west) <i>Refer to sheet 11 of Figure 6.7.4</i>	The visual experience along the major highways is partly influenced by the roadside character and changes relatively quickly as motorists travel through different landscapes. A combination of intact hedgerows and grassy field margins generally define the roadside. Where there is limited or no vegetation along the road, large industrial buildings and structures, together with a vast network of pylons, can be experienced at various distances across a flat expanse of wetland and farmland, seemingly in all directions. The roads typically pass through the landscape at grade which contributes to

Visual Receptor	Representative viewpoints (Figure 6.7.2)	Baseline description
		the sense of openness in these views. There are however rare instances of superficial landforms such as roadside embankments planted with mature vegetation such as along the A1085 which provide a relative sense of enclosure. The North Yorks Moors also provides the backdrop in easterly views.
Motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane)	M - Within the Proposed Development Site (Hydrogen Pipeline (west)). <i>Refer to sheet 13 of Figure 6.7.4</i>	Motorists along local highways experience similar views to some of the nearby major highways insofar as they extend beyond grass verges and across large expanses of pasture. Active and restored landfill sites often create variation with their superficial landforms in the middle distance. Electricity pylons and industry in and around Seal Sands also punctuate the horizon albeit towards the background. The North York Moors is a defining feature of the backdrop in easterly views, particularly from Cowpen Bewley Road. Woodland and high-sided hedgerows in and around the village of Cowpen Bewley otherwise channel views along these roads and at the same time prevent more distant views beyond including of neighbouring light industry.
Recreational users of the King Charles III England Coast Path between Hartlepool and Redcar	A - 8 km to the north of the Proposed Development Site B - 4.2 km to the north of the Development Site C - 2.3 km to the north of the Development Site D - 1.9 km to the north of the Development Site <i>Refer to sheets 1 - 4 of Figure 6.7.4</i> H - 3 km to the south of the Proposed Development Site <i>Refer to sheet 8 of Figure 6.7.4</i> J - Within the Proposed Development Site K - 500 m to the south of the Proposed Development Site	The visual experience of the King Charles III English Coast Path is influenced by its alignment along the coast and the presence of surrounding development. Where the route passes along the coastline, views are typically defined by sandy beaches and exposed rocky scars which contribute to a relatively high scenic quality. Where it meanders through Middlesbrough and the Tees estuary, views are defined predominantly by the expansive wetlands and surrounding industry which includes large scale warehouse-style buildings, chimney stacks and other related infrastructure such as above ground pipelines. Views from around Middlesbrough Dock are characterised by the surrounding port but also take in modern and historic landmarks which provide a sense of time depth. In longer distance views in a south-easterly direction, the North York Moors provides an attractive backdrop.

Visual Receptor	Representative viewpoints (Figure 6.7.2)	Baseline description
Recreational users of NCN Route 14 around Hartlepool Bay	B - 4.2 km to the north of the Proposed Development Site	Recreational users of Route 14 around Hartlepool Bay experience scenic coastal views partly framed by the North York Moors to the south. The wide-open bay contributes to a strong sense of openness, whilst exposed rocky scars add great visual interest to the sands. The views are also influenced by the built form and superficial landforms fronting this part of the coastline, becoming more urban in the southern of the route around Seaton Carew. The offshore Teesside Wind Farm is also noticeable in more distant views to the south-east.
Recreational users of NCN Route 65 around Middlesbrough Dock	H - 3 km to the south of the Proposed Development Site	Views experienced by recreational users of NCN Route 65 around Middlesbrough Dock are predominantly characterised by warehouse buildings, docking cranes, and shipping containers, which contributes to the prevailing industrial character of the riverside. A number of landmarks within Middlesbrough can also be appreciated from this section of the route including the distinctive Hydraulic Clock Tower.
Residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heugh)	A - 8 km to the north of the Proposed Development Site B - 2.3 km to the north of the Proposed Development Site	Residents at the eastern edge of Hartlepool generally experience relatively scenic coastal views across Hartlepool Bay. Coastal roads provide the foreground to views that otherwise overlook sandy beaches interspersed with exposed rocky scars, piers and breakwaters. In the background of southerly views, heavy industry and wind turbines are experienced around the Tees estuary. The silhouette of the North York Moors to the south-east also provides the backdrop to longer range views.
Residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley)	G - 2.9km to the south of the Proposed Development Site <i>Refer to sheet 7 of Figure 6.7.4</i> H - 3 km to the south of the Proposed Development Site M - Within the Proposed Development Site	Residents at the northern edge of Middlesbrough typically experience views over expanses of wetland. The foreground of these views is often characterised by informal recreational uses along the settlement edge such as allotments or parkland which contributes to the prevailing verdant character. Woodland and tree cover adjacent or close to the settlement edge restricts views beyond but where gaps allow, heavy industry in and around Seal Sands can be experienced. Pylons also regularly punctuate the skyline towards the background of these views. The North York Moors is also a defining feature of the distant skyline in southerly views.

Visual Receptor	Representative viewpoints (Figure 6.7.2)	Baseline description
Visitors to Teesmouth NNR	C - 2.3 km to the north of the Proposed Development Site D - 1.9 km to the north of the Proposed Development Site E - 3.5 km to the north of the Proposed Development Site <i>Refer to sheet 5 of Figure 6.7.4</i>	Visitors to Teesmouth NNR experience close distance views of intact dunes and sandy beaches which creates a strong sense of openness. Views across the estuary are otherwise characterised by tall industrial buildings and structures, including the neighbouring Hartlepool Power Station. Industrial stacks and flues regularly punctuate the local skyline and, in south-easterly views, are experienced against the backdrop of the North York Moors.
Visitors to Saltholme Nature Reserve	I - 200 m to the South of the Proposed Development Site <i>Refer to sheet 9 of Figure 6.7.4</i> J - Within the Proposed Development Site	Visitors to Saltholme Nature Reserve experience expansive views over intact wetland vegetation. These views are largely characterised by reedbeds, wet grasslands and open pools which extend from the foreground and middle distance and can be observed from identified viewing platforms within the Nature Reserve. The background of the views is regularly punctuated by industrial buildings and structures including tall stacks, cooling towers and pylons, seemingly in all directions. The North York Moors adds visual interest to the distant skyline in the east and south.
Visitors to Cowpen Bewley Woodland Park	L - 750 m to the north of the Proposed Development Site <i>Refer to sheet 12 of Figure 6.7.4</i>	The experience of visitors to Cowpen Bewley Woodland Park is largely influenced by its undulating landform and concentration of woodland. Visitors typically experience views along meandering trails through woodland or across grassy areas defined by further wooded swathes. However, a relatively elevated mound in the east of the park provides a local VP where 360-degree panoramic views can be achieved. This includes views of the extensive wetlands including Cowpen Marsh extending from the middle distance and beyond. Towards the background of easterly views, clusters of tall industrial buildings and structures are experienced against the North York Moors.
Visitors to the Teesdale Way Viewpoint along the South Gare Breakwater	E - 3.5km to the north of the Proposed Development Site	Visitors to the Teesdale Way Viewpoint experience expansive views across the Tees Estuary and Tess Bay beyond. The open water is a key feature of this view as it extends from the rocky beaches in the foreground. On the opposite side of the bay, industrial buildings and structures fringing open sands are defining features of the background.

Visual Receptor	Representative viewpoints (Figure 6.7.2)	Baseline description
Visitors to the River Tees Viewpoint along the southern riverside	G - 2.9 km to the south of the Proposed Development Site	River Tees Viewpoint provides a relatively elevated VP overlooking the Tees and surrounding riverside. Visitors to identified viewpoint experience panoramic views across the river in the middle distance albeit partly filtered by foreground vegetation and with heavy industry extending across much of the background. Tall buildings and structures including industrial stacks are a common feature of the view.
Visitors to the Eston Beacon within the North York Moors National Park	F - 2.5 km to the south of the Proposed Development Site <i>Refer to sheet 6 of Figure 6.7.4</i>	Visitors to the Eston Beacon experience panoramic and far-ranging views across Teesside. Views are typically characterised by the moor in the foreground with the suburbs of Middlesbrough in the middle distance. Heavy industry including associated plumes is also noticeable along the River Tees, seemingly blending with the surrounding settlement. The elevated position also allows for longer distance views over the sea in the background.

Future Baseline

- 6.7.26 In the absence of the Proposed Development, the local area is likely to be subject to continued major industrial development due to the strategic location of the Tees estuary and the long-established infrastructure which facilitates the dominant industrial land uses. The Stockton-on-Tees Local Plan has identified land at Seals Sands including some areas within the Proposed Development Site as Specialist Employment Allocations which will likely see existing industrial land uses become more intensive. The numerous statutory ecological designations in the estuary provide a key constraint to new development so it is expected that the expanses of wetland in and around the estuary will remain untouched.
- 6.7.27 For the purposes of the LVIA, the future baseline scenario will assume the Specialist Employment Allocations in the Stockton-on-Tees Local Plan are fully built out during the operation phase.

Potential Impacts

- 6.7.28 This section identifies potential impacts in relation to the construction, operation and decommissioning of the Proposed Development. The HPF and the Hydrogen Pipeline(s) have been considered separately to allow the different potential impacts to be appraised. The resulting effects will be assessed together in the ES.

Hydrogen Production Facility – construction

- 6.7.29 The potential sources of landscape and visual impacts during the construction phase of the proposed HPF would include the presence and views of:
- temporary boundary hoardings, materials storage, construction compounds and welfare facilities;
 - demolishing redundant process equipment, including a flare, and removing an existing reedbed;
 - landscape works including vegetation clearance and planting of new mitigation vegetation;
 - earthworks including excavation and regrading of ground levels, and stockpiling of materials;
 - HGVs, deliveries and transportation of materials and associated construction traffic and activity in and around the HPF Area;
 - construction of new buildings, process plant and equipment for the HPF including generating station (Phase 2), stacks and flare, including the use of piling equipment, cranes, and temporary scaffolding; and
 - temporary lighting to facilitate nighttime working and as required for security.
- 6.7.30 The construction works for Phase 1 of the HPF will last approximately four years. If progressed, the construction of an additional up to two trains (Phase 2) of HPF together with associated development, would follow some time after Phase 1 and last approximately four years per train, as detailed in Section 3.4.

Landscape

National character areas

- 6.7.31 NCA 23: Tees Lowlands provides a high-level overview of the prevailing landscape character and the background to more detailed regional level landscape character assessments.
- 6.7.32 Given the large geographic extent of the character area relative to the Proposed Development Site, construction impacts of the proposed HPF on NCA 23 are therefore proposed to be **Scoped Out** of the LVIA.

Local landscape character areas

- 6.7.33 The construction works associated with the proposed HPF have the potential to directly impact on the character of LCA East Billingham to Teesmouth.
- 6.7.34 It is likely that the construction works would be perceived in an already busy and disturbed landscape where existing plant are found in surrounding

landfill sites and industrial works alongside container cranes. Major transport corridors also pass through the LCA and accommodate a high volume of HGV traffic and, which introduce high levels of movement. The Stockton-on-Tees LCA acknowledges that where areas are dominated by industrial features and hardstanding, the landscape is of a poor condition. The construction of the proposed HPF would be restricted to a relatively small area of scrubby meadow and hardstanding adjacent to the existing CATS Terminal, so it is considered that the positive landscape features outside of the Proposed Development Site boundary, such as the extensive wetland habitats, are unlikely to be affected by the construction works on the Proposed Development Site.

- 6.7.35 The construction activities associated with the proposed HPF would not result in changes to the key characteristics and therefore LCA East Billingham to Teesmouth is proposed to be **Scoped Out** of the LVIA.

Seascape Character Assessment for the North East Inshore and Offshore marine plan areas

- 6.7.36 MCA 22: Tyne, Tees and Wear Estuaries and Coastal Waters provides a strategic overview of the character of the coastal waters adjacent to the Proposed Development Site. Given the small scale of the Proposed Development Site within the context of the extensively developed coast within this large seascape character area, the proposed HPF on MCA 22 are therefore proposed to be **Scoped Out** of the LVIA.

Physical landscape features and overall character of the Proposed Development Site

- 6.7.37 Industrial development already substantially influences the character of the Proposed Development Site and surrounding landscape. The HPF Area currently comprises scrubby grassland defined by access tracks, areas of hardstanding and security fencing, so as is inevitable with large scale development on a brownfield site, the existing vegetation would be largely removed as a result of the construction works.
- 6.7.38 The Proposed Development Site is not located within a nationally designated landscape and does not otherwise constitute a valued landscape. However, given the scale of the construction works associated with the proposed HPF, changes to the character of the Proposed Development Site would likely be significant at a local scale. Construction impacts within the proposed HPF Area are therefore proposed to be **Scoped In** to the LVIA.

Visual Amenity

- 6.7.39 Table 6.34 below considers the implications of the construction of the proposed HPF on each identified visual receptor.

Table 6.34: Potential construction impacts of the hydrogen production facility on visual receptors

Visual Receptor	Commentary
Motorists along major highways between Hartlepool and Redcar (A178, A1185, A1085)	Views experienced by motorists along major highways between Hartlepool and Redcar are characterised by the extensive industrial development in and around the Proposed Development Site and throughout Teesside. Views of the construction works associated with the proposed HPF would be restricted in some places by the varied roadside character including intact hedgerows and occasional earth bunds. However, where views extend beyond the roadside, the construction works would be experienced in context with existing plant within surrounding landfill sites and nearby industrial works including container cranes. These views are regularly punctuated by vertical elements including pylons so taller construction plant associated with the proposed HPF such as cranes would not form incongruent features. A steady stream of HGV traffic is also a common feature in these views so any increase in HGV traffic is not likely to be discernible. Given that views within this area are not designated and the people are traveling and will have low susceptibility to change in their views, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of motorists along major highways between Hartlepool and Redcar. Construction impacts of the proposed HPF on these motorists are therefore proposed to be Scoped Out of the LVIA.
Motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane)	Built form and vegetation in and around Cowpen Bewley would largely restrict views towards the HPF Area from most of the identified local highways. Views would however be experienced by motorists along Cowpen Bewley Road where the construction works associated with the proposed HPF would be discernible towards the background. Construction works would form a very small part of these wide and open views. These views are also regularly punctuated by vertical elements including pylons so taller construction plant associated with the proposed HPF such as cranes would not form incongruent features. Given that views within this area are not designated and the people are traveling and will have low susceptibility to change in their views, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of motorists along local highways. Construction impacts of the proposed HPF on these motorists are therefore proposed to be Scoped Out of the LVIA.
Recreational users of the King Charles III England Coast Path between Hartlepool and Redcar	Views experienced by recreational users of the English Coast Path are varied and are often of great visual interest. Views in the general direction of the proposed HPF are largely influenced by the surrounding industry where chimneys, flare stacks, and, to a lesser extent, container cranes regularly punctuate the skyline. Construction works would be experienced in this industrial context so any cranes on tall construction plant would not form incongruent features in these views. It is also not uncommon to see large volumes of HGV traffic in views from some sections of the route so any increase in HGV movements is not likely to be discernible.

Visual Receptor	Commentary
	Despite people on the coastal path have a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of recreational users of the King Charles III England Coast Path between Hartlepool and Redcar. Construction impacts of the proposed HPF on these public footpath users are therefore proposed to be Scoped Out of the LVIA.
Recreational users of National Cycle Network (NCN) Route 14 around Hartlepool Bay	Recreational users of NCN Route 14 around Hartlepool Bay experience distant views towards the Proposed Development Site and across a busy foreground comprising a suburban seafront. Construction works of the proposed HPF would form a very small part of the background to these wide and open views. The background of these views is also characterised by countless vertical elements including industrial stacks and flare stacks around the Tees estuary so taller construction plant associated with the proposed HPF such as cranes would not form incongruent features. Despite cyclists on the network route having a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Construction impacts of the proposed HPF on these cyclists are therefore proposed to be Scoped Out of the LVIA.
Recreational users of NCN Route 65 around Middlesbrough Dock	Recreational users of NCN Route 65 around Middlesbrough Dock do not have direct sight of the Proposed Development Site area, so views of the construction works would be limited to the taller elements such as cranes. Taller construction plant and cranes associated with the proposed HPF would be experienced in context with container cranes and other tall vertical elements such as industrial stacks along the Tees, and so would not be out of keeping with the prevailing character. Despite cyclists on the network route having a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Construction impacts of the proposed HPF on these cyclists are therefore proposed to be Scoped Out of the LVIA.
Residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heagh)	Residents at the eastern edge of Hartlepool experience distant views towards the Proposed Development Site and these views generally inhibit relatively high scenic qualities. Construction works of the proposed HPF would form a very small part of the background to these wide and open views. The background of these views is also characterised by countless vertical elements including industrial stacks and flare stacks around the Tees estuary so taller construction plant associated with the proposed HPF such as cranes would not form incongruent features. Despite residents at home having a higher susceptibility to change in their views, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of residents at the eastern edge of

Visual Receptor	Commentary
	Hartlepool. Construction impacts of the proposed HPF on these residents are therefore proposed to be Scoped Out of the LVIA.
Residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley)	Built form and vegetation in and around the settlement edge would largely restrict views towards the site of the proposed HPF Area from most places within the settlement. From occasional gaps along the settlement edge, views would however be experienced by residents where the construction works associated with the proposed HPF would be discernible towards the background. Construction works would form a very small part of these wide and open views. These views are also regularly punctuated by vertical elements including pylons so taller construction plant associated with the proposed HPF such as cranes would not form incongruent features. Despite residents at home having a higher susceptibility to change in their views, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of residents at the northern edge of Middlesbrough. Construction impacts of the proposed HPF on these residents are therefore proposed to be Scoped Out of the LVIA.
Visitors to Teesmouth NNR	Views experienced by visitors to Teesmouth NNR are typically characterised by tall vertical elements such as industrial stacks and flare stacks fringing the open sands in the close distance and extending into the far distance. Construction works of the proposed HPF Area would form a small part of the background to these wide and open views. Any taller plant including cranes associated with the proposed HPF would be experienced in context with these surrounding structures so would not be incongruent or prominent in these views. Despite visitors to the NNR having a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of visitors to Teesmouth NNR. Construction impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to Saltholme Nature Reserve	Views experienced by visitors to Saltholme Nature Reserve are regularly punctuated by industrial buildings and structures in the background. Construction works related to the proposed HPF including any taller plant and cranes would form a small part of these views and would be experienced on an already highly varied and busy skyline. Despite visitors to the NR having a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of visitors to Saltholme Nature Reserve. Construction impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to Cowpen Bewley Woodland Park	Most views out of Cowpen Bewley Woodland Park are screened by large swathes of woodland, but from the VP in the north-east of the park, visitors experience panoramic views across the surrounding landscape. The construction works of the proposed HPF including

Visual Receptor	Commentary
	cranes and taller plant would be experienced towards the background of these views and in a heavily industrial context which is regularly punctuated by clusters of tall buildings and structures so would not be incongruent or prominent in these views. Despite visitors to the park having a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of visitors to Cowpen Bewley Woodland Park. Construction impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the Teesdale Way Viewpoint along the South Gare Breakwater	Visitors to the Teesdale Way Viewpoint experience wide coastal views with extensive industry at Seal Sands forming the backdrop. Construction works of the proposed HPF would form a small part of the background to these wide and open views. Any taller plant including cranes associated with the proposed HPF would be experienced in context with the surrounding industrial structures so would not be incongruent or prominent in these views. Despite visitors to the breakwater having a higher susceptibility to change in their views, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of visitors to Teesdale Way Viewpoint. Construction impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the River Tees Viewpoint along the southern riverside	Visitors to the River Tees Viewpoint experience panoramic views over the Tees and of the industrial riverside. Large scale earthworks in the middle distance would predominantly screen views of construction associated with the proposed HPF. Taller construction plant and cranes would however be experienced towards the background in context with container cranes and other tall vertical elements such as industrial stacks along the Tees estuary, and so would not be out of keeping with the prevailing character. Despite visitors to the riverside having a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of visitors to River Tees Viewpoint. Construction impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the Eston Beacon within the North York Moors National Park	The construction works of the proposed HPF would form a very small feature in the far distance of views from Eston Beacon. Construction works would also be experienced in context with heavy industry along the River Tees so would not form an incongruent or prominent feature in these views. Despite visitors to the National Park having a higher susceptibility to change in their views within a designated context, it is considered that the construction activities associated with the proposed HPF would not result in significant changes to the visual amenity of visitors to Eston Beacon. Construction impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.

Hydrogen Production Facility – operation

6.7.40 The potential sources of landscape and visual impacts during operation of the Proposed HPF would include:

- change of use from scrubby meadow and hardstanding to heavy industry with ancillary structures and elements including associated parking, access roads, and security fencing;
- existence of new built form including a new HPF, cooling towers and stacks including auxiliary boiler stacks, and flare stacks and in Phase 2, electricity generation infrastructure including associated generating station building(s) and stack(s). Refer to paragraphs 3.2.9 - 3.2.10;
- loss of wetland vegetation including existing reed bed and ponds; and
- creation of new landscaping including mitigation planting.

Landscape

National character areas

6.7.41 Given the large geographic extent of the character area relative to the Proposed Development Site, it is considered that the scale of the proposed HPF would not result in changes to the key characteristics of NCA 23 and therefore effects on this receptor are proposed to be **Scoped Out** of the LVIA.

Local landscape character areas

6.7.42 The proposed HPF has the potential to directly impact on the character of LCA East Billingham to Teesmouth.

6.7.43 It is likely the proposed HPF would be perceived in an already heavily industrialised landscape where industry dominating the area along the River Tees is noted as a key characteristic. Industrial development and major transport corridors passing through the LCA create a relatively disturbed landscape, and this results in a relatively poor landscape condition as acknowledged by the Stockon-on-Tees LCA. It is considered that the positive landscape features of the LCA are unlikely to be substantially affected by the proposed HPF.

6.7.44 It is considered that the proposed HPF would not result in changes to the key characteristics and therefore effects on LCA East Billingham to Teesmouth are proposed to be **Scoped Out** of the LVIA.

Seascape Character Assessment for the North East Inshore and Offshore marine plan areas

6.7.45 MCA 22: Tyne, Tees and Wear Estuaries and Coastal Waters provides a strategic overview of the character of the coastal waters adjacent to the Proposed Development Site. Given the small scale of the Proposed Development Site within the context of the extensively developed coast

within this large seascape character area, the proposed HPF on MCA 22 are therefore proposed to be **Scoped Out** of the LVIA.

Physical landscape features and overall character of the Proposed Development Site

- 6.7.46 This baseline appraisal has found that industrial development has substantial influences on the Proposed Development Site and surrounding landscape. The grassland and access tracks within the HPF Area would be replaced by built form associated with the HPF.
- 6.7.47 The Proposed Development Site is not located within a nationally designated landscape and does not otherwise constitute a valued landscape. However, given the scale of the proposed HPF, changes to the character of the Proposed Development Site would likely be significant. Operation impacts of the proposed HPF on the Proposed Development Site are therefore proposed to be **Scoped In** to the LVIA.

Visual amenity

- 6.7.48 Table 6.35 below considers the implications of the proposed HPF at operation on each identified visual receptor.

Table 6.35: Potential operation impacts of the hydrogen production facility on visual receptors

Visual Receptor	Commentary (Refer to Table 6.34 for baseline commentary)
Motorists along major highways between Hartlepool and Redcar (A178, A1185, A1085)	It is considered that the proposed HPF would not result in significant changes to the visual amenity of motorists along major highways between Hartlepool and Redcar. Operation impacts of the proposed HPF on these motorists are therefore proposed to be Scoped Out of the LVIA.
Motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane)	It is considered that the proposed HPF would not result in significant changes to the visual amenity of motorists along local highways. Operation impacts of the proposed HPF on these motorists are therefore proposed to be Scoped Out of the LVIA.
Recreational users of the King Charles III England Coast Path between Hartlepool and Redcar	It is considered that the proposed HPF would not result in significant changes to the visual amenity of recreational users of the King Charles III England Coast Path between Hartlepool and Redcar. Operation impacts of the proposed HPF on these public footpath users are therefore proposed to be Scoped Out of the LVIA.
Recreational users of NCN Route 14 around Hartlepool Bay	It is considered that the proposed HPF would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Operation impacts of the proposed HPF on these cyclists are therefore proposed to be Scoped Out of the LVIA.

Visual Receptor	Commentary (Refer to Table 6.34 for baseline commentary)
Recreational users of NCN Route 65 around Middlesbrough Dock	It is considered that the proposed HPF would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Operation impacts of the proposed HPF on these cyclists are therefore proposed to be Scoped Out of the LVIA.
Residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heagh)	It is considered that the proposed HPF would not result in significant changes to the visual amenity of residents at the eastern edge of Hartlepool. Operation impacts of the proposed HPF on these residents are therefore proposed to be Scoped Out of the LVIA.
Residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley)	It is considered that the proposed HPF would not result in significant changes to the visual amenity of residents at the northern edge of Middlesbrough. Operation impacts of the proposed HPF on these residents are therefore proposed to be Scoped Out of the LVIA.
Visitors to Teesmouth NNR	It is considered that the proposed HPF would not result in significant changes to the visual amenity of visitors to Teesmouth NNR. Operation impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to Saltholme Nature Reserve	It is considered that the proposed HPF would not result in significant changes to the visual amenity of visitors to Saltholme Nature Reserve. Operation impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to Cowpen Bewley Woodland Park	It is considered that the proposed HPF would not result in significant changes to the visual amenity of visitors to Cowpen Bewley Woodland Park. Operation impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the Teesdale Way Viewpoint along the South Gare Breakwater	It is considered that the proposed HPF would not result in significant changes to the visual amenity of visitors to Teesdale Way Viewpoint. Operation impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the River Tees Viewpoint along the southern riverside	It is considered that the proposed HPF would not result in significant changes to the visual amenity of visitors to River Tees Viewpoint. Operation impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the Eston Beacon within the North York Moors National Park	It is considered that the proposed HPF would not result in significant changes to the visual amenity of visitors to Eston Beacon. Operation impacts of the proposed HPF on these visitors are therefore proposed to be Scoped Out of the LVIA.

Hydrogen Production Facility – decommissioning

6.7.49 It is assumed that the landscape and visual effects associated with the decommissioning phase of the HPF would arise from the removal of all

above-ground structures and associated ground remediation works. It is considered that these impacts will not exceed those reported for construction at section 6.7.29, and therefore the same landscape and visual receptors are proposed to be **Scoped In/ Out** of the LVIA as identified for the construction.

Hydrogen Pipeline(s) – construction

- 6.7.50 Paragraph 3.2.20 explains that it is anticipated that the Hydrogen Pipeline(s) will be installed predominantly below ground, with above ground elements only where off-taker connections are required, although this is subject to further design development and the final design will be confirmed in the ES that accompanies the Application. A number of AGI will be required to enable potential off-takers to connect to the hydrogen distribution system. Their locations and maximum dimensions will be detailed within the ES.
- 6.7.51 The potential sources of landscape and visual impacts during the construction phase of the proposed Hydrogen Pipeline would include the presence and views of:
- temporary boundary hoardings, materials storage, construction compounds and welfare facilities;
 - landscape works including vegetation clearance and planting of new mitigation vegetation;
 - earthworks including topsoil stripping, trench excavation, regrading of ground levels, and stockpiling of materials;
 - HGV deliveries and transportation of materials and associated construction traffic and activity around the Proposed Development Site;
 - construction of a number of AGI;
 - laying of below ground (and above ground sections of) pipelines including the use of plant and machinery associated with trenchless and open-trench techniques; and
 - temporary lighting to facilitate nighttime working and as required for security.
- 6.7.52 The Hydrogen Pipeline(s) would be constructed during Phase 1 of the Proposed Development (refer to Section 3.4).

Landscape

National character areas

- 6.7.53 Given the large geographic extent of the character area relative to the Proposed Development Site, construction impacts of the proposed Hydrogen Pipeline on NCA 23 are therefore proposed to be **Scoped Out** of the LVIA.

Local landscape character areas

- 6.7.54 The construction works associated with the proposed Hydrogen Pipeline(s) have the potential to directly impact on the character of LCA East Billingham to Teesmouth.
- 6.7.55 It is likely that the construction works would be perceived in an already busy and disturbed landscape where existing plant are found in surrounding landfill sites and industrial works alongside container cranes. Major transport corridors also pass through the LCA and accommodate a high volume of HGV traffic, and which introduce high levels of movement in the landscape. The Stockton-on-Tees LCA acknowledges that where areas are dominated by industrial features and hardstanding, the landscape has a poor condition. The Hydrogen Pipeline (west) would extend beyond the main industrial core at Seal Sands and would coincide with mixed farmland and woodland surrounding Cowpen Bewley which are susceptible to loss as a result of construction.
- 6.7.56 The specific construction techniques for the Hydrogen Pipeline (west) are subject to ongoing design development. Considering worst-case assumptions, there is potential for the construction works to impact on the positive landscape features such as the woodland in and around Cowpen Bewley Woodland Park which is otherwise rare in this landscape. Generally, the open cut trench approach to pipeline installation would have greater impacts on the landscape than other trenchless methodologies such as thrust boring or HDD.
- 6.7.57 The construction activities associated with the proposed Hydrogen Pipeline (west) could result in changes to the key characteristics and therefore LCA East Billingham to Teesmouth is proposed to be **Scoped In** to the LVIA.
- 6.7.58 The Hydrogen Pipeline (east) would be restricted to the industrial areas within Wilton International which is largely influenced by existing industrial development. As such this would not result in changes to the key characteristics and therefore Redcar and Cleveland LCA is proposed to be **Scoped Out** of the LVIA.

Physical landscape features and overall character of the Proposed Development Site

- 6.7.59 This baseline appraisal has found that industrial development has substantial influences on the Proposed Development Site and surrounding landscape. The Hydrogen Pipeline largely follows the route of existing above ground pipelines, but the Hydrogen Pipeline (west) crosses scrubby pasture and established woodland around Cowpen Bewley, which is otherwise rare in this landscape and is susceptible to loss as a result of construction. These positive landscape features have the potential to be impacted by the construction works of the Hydrogen Pipeline as described

in section 6.7.51 above.

- 6.7.60 The Proposed Development Site is not located within a nationally designated landscape and does not otherwise constitute a valued landscape. However, given the potential scale of the construction works associated with the Hydrogen Pipeline, removal of vegetation and resultant changes to the character of the Proposed Development Site could be significant. Construction impacts of the proposed Hydrogen Pipeline on the Proposed Development Site are therefore proposed to be **Scoped In** to the LVIA.

Visual amenity

- 6.7.61 Table 6.36 below considers the implications of the proposed Hydrogen Pipeline at construction on each identified visual receptor.

Table 6.36: Potential construction impacts of Hydrogen Pipeline on visual receptors

Visual Receptor	Commentary
Motorists along major highways between Hartlepool and Redcar (A178, A1185, A1085)	Views experienced by motorists along major highways between Hartlepool and Redcar are characterised by the extensive industrial development throughout Teesside. Views of the construction works associated with the proposed Hydrogen Pipeline would be mostly restricted to close distance views where these roads cross the Hydrogen Pipeline route. The construction works would be experienced adjacent to existing above ground pipelines, which are vast in some places, and in context with existing plant within surrounding landfill sites and nearby industrial works. The background of these views is regularly punctuated by vertical elements including pylons so taller construction plant associated with the proposed Hydrogen Pipeline would not form incongruent features. A steady stream of HGV traffic is also a common feature in these views so any increase in HGV traffic is not likely to be discernible. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of motorists along major highways between Hartlepool and Redcar. Construction impacts of the proposed Hydrogen Pipeline on these motorists are therefore proposed to be Scoped Out of the LVIA.
Motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane)	The Hydrogen Pipeline route bisects and passes parallel to the identified local highways so motorists would experience sequential and close distance views of the Hydrogen Pipeline construction. Given the specific construction technique is unknown at this stage, open trenches and associated construction plant could form a substantial addition to these views. It is considered that the construction activities associated with the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of motorists along local highways. Construction

Visual Receptor	Commentary
	impacts of the proposed Hydrogen Pipeline on these motorists are therefore proposed to be Scoped In to the LVIA.
Recreational users of the King Charles III England Coast Path between Hartlepool and Redcar	Views experienced by recreational users of the King Charles III England Coast Path are varied and are often of great visual interest. Intervening built form and vegetation would screen more distant views of the construction works associated with proposed Hydrogen Pipeline. Where the Coast Path intersects the route of the Hydrogen Pipeline, the construction works could be experienced within close distance views and given the specific construction technique is unknown at this stage, open trenches and associated construction plant could substantially transform the foreground. It is considered that the construction activities associated with the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of recreational users of the King Charles III England Coast Path between Hartlepool and Redcar. Construction impacts of the proposed Hydrogen Pipeline on these public footpath users are therefore proposed to be Scoped In to the LVIA.
Recreational users of NCN Route 14 around Hartlepool Bay	Recreational users of NCN Route 14 around Hartlepool Bay experience distant views towards the Site and across a busy foreground comprising a suburban seafront. Construction works of the proposed Hydrogen Pipeline would be predominantly screened by intervening built form and vegetation. Any taller construction plant is unlikely to be discernible from this distance. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Construction impacts of the proposed Hydrogen Pipeline on these cyclists are therefore proposed to be Scoped Out of the LVIA.
Recreational users of NCN Route 65 around Middlesbrough Dock	Recreational users of NCN Route 65 around Middlesbrough Dock do not have direct sight of the Site area, so construction works of the proposed Hydrogen Pipeline would be predominantly screened by intervening built form and vegetation. Any taller construction plant is unlikely to be discernible from this distance. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Construction impacts of the proposed Hydrogen Pipeline on these cyclists are therefore proposed to be Scoped Out of the LVIA.
Residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heagh)	Residents at the eastern edge of Hartlepool experience distant views towards the Tees estuary and these views generally inhibit relatively high scenic qualities. Construction works of the proposed Hydrogen Pipeline would be predominantly screened by intervening built form and vegetation. Any taller construction plant is unlikely to be discernible from this distance. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of residents at the eastern edge of Hartlepool. Construction impacts of the proposed Hydrogen

Visual Receptor	Commentary
	Pipeline on these residents are therefore proposed to be Scoped Out of the LVIA.
Residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley)	Intervening vegetation in and around RSPB Salholme would screen views of the Hydrogen Pipeline construction from residents at High Clarence. Residents at Cowpen Bewley would however experience close distance views of the Hydrogen Pipeline construction in and around the village. Given the specific construction technique is unknown at this stage, open trenches and associated construction plant could form a substantial addition to these views. It is considered that the construction activities associated with the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of residents at the northern edge of Middlesbrough. Construction impacts of the proposed Hydrogen Pipeline on these residents are therefore proposed to be Scoped In to the LVIA.
Visitors to Teesmouth NNR	Views experienced by visitors to Teesmouth NNR are typically characterised by tall vertical elements such as chimneys and flare stacks fringing the open sands in the close distance and extending into the far distance. Construction works of the proposed Hydrogen Pipeline would be predominantly screened by intervening built form and vegetation. Any taller construction plant is unlikely to be discernible from this distance. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to Teesmouth NNR. Construction impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to Salholme Nature Reserve	Views experienced by visitors to Salholme Nature Reserve are regularly punctuated by industrial buildings and structures in the background. However, where the Hydrogen Pipeline route intersects the visitor centre driveway, the construction works could be experienced within close distance views. There are also instances within the Nature Reserve where tall construction plant could be experienced in the middle distance of northerly outward views. Given the specific construction technique is unknown at this stage, open trenches and associated construction plant could substantially transform the close and middle distance of these views. It is considered that the construction activities associated with the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of visitors to Salholme Nature Reserve. Construction impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped In to the LVIA.
Visitors to Cowpen Bewley Woodland Park	Most views out of Cowpen Bewley Woodland Park are screened by large swathes of woodland, but from the VP in the north-east of the park, visitors experience panoramic views across the surrounding landscape. The construction works of the proposed Hydrogen Pipeline including taller plant would be experienced in the foreground and towards the middle distance of these views. Given the specific construction technique is unknown at this stage, open trenches and associated construction plant could substantially transform the close and middle distance of these

Visual Receptor	Commentary
	views. This could be exasperated by woodland removal in the Park as a result of associated construction works. It is considered that the construction activities associated with the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of visitors to Cowpen Bewley Woodland Park. Construction impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped In to the LVIA.
Visitors to the Teesdale Way Viewpoint along the South Gare Breakwater	Visitors to the Teesdale Way Viewpoint experience wide coastal views with extensive industry at Seal Sands forming the backdrop. Construction works of the proposed Hydrogen Pipeline would be predominantly screened by intervening built form and vegetation. Any taller construction plant is unlikely to be discernible from this distance. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to Teesdale Way Viewpoint. Construction impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the River Tees Viewpoint along the southern riverside	Visitors to the River Tees Viewpoint experience panoramic views over the Tees and of the industrial riverside. Large scale earthworks in the middle distance would predominantly screen views of construction associated with the proposed Hydrogen Pipeline. Any taller construction plant is unlikely to be discernible from this distance. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to River Tees Viewpoint. Construction impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the Eston Beacon within the North York Moors National Park	The construction works of the proposed Hydrogen Pipeline would form a very small feature in the far distance of views from Eston Beacon. Construction works would also be experienced in context with heavy industry along the River Tees so would not form an incongruent or prominent feature in these views. It is considered that the construction activities associated with the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to Eston Beacon. Construction impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.

Hydrogen Pipeline(s) – operation

- 6.7.62 The potential sources of landscape and visual impacts during operation of the Proposed Development would include:
- existence of new built form and supporting infrastructure (where pipeline infrastructure is above ground) including AGI;
 - maintenance tracks with irregular vehicle movement;
 - creation of replacement wetland vegetation including reed beds; and

- creation of new landscaping including mitigation planting.

Landscape

National character areas

- 6.7.63 Given the large geographic extent of the character area relative to the Proposed Development Site, it is considered that the scale of the proposed Hydrogen Pipeline would not result in changes to the key characteristics of NCA 23 and therefore effects on this receptor are proposed to be **Scoped Out** of the LVIA.

Local landscape character areas

- 6.7.64 The proposed Hydrogen Pipeline has the potential to directly impact on the character of LCA East Billingham to Teesmouth.
- 6.7.65 It is likely that any potential above ground features associated with the Hydrogen Pipeline would be perceived in an already heavily industrialised landscape where industry dominating the area along the River Tees is noted as a key characteristic. Industrial development and major transport corridors passing through the LCA create a relatively disturbed landscape, and this results in a relatively poor landscape condition as acknowledged by the Stockon-on-Tees LCA.
- 6.7.66 A large part of the Hydrogen Pipeline (east) extends into the Wilton International complex which includes various warehouse-style buildings, tall stacks, above ground pipelines, bridge and access roads.
- 6.7.67 However, the Hydrogen Pipeline (west) would extend beyond the main industrial core at Seal Sands and would coincide with mixed farmland and woodland surrounding Cowpen Bewley which are susceptible to loss as a result of above ground features. Given the specific pipeline laying method for the Hydrogen Pipeline is unknown at this stage, there is potential for the Hydrogen Pipeline to result in the loss of positive landscape features such as the woodland in and around Cowpen Bewley Woodland Park during operation, which is otherwise rare in this landscape.
- 6.7.68 It considered that the proposed Hydrogen Pipeline could result in changes to the key characteristics of and therefore effects on LCA East Billingham to Teesmouth are proposed to be **Scoped In** to the LVIA.

Physical landscape features and overall character of the Site

- 6.7.69 This baseline appraisal has found that industrial development has substantial influences on the Proposed Development Site and surrounding landscape. The Hydrogen Pipeline largely follows the route of existing above ground pipelines, but the Hydrogen Pipeline (west) crosses scrubby pasture and established woodland around Cowpen Bewley, which is otherwise rare in this landscape and is susceptible to loss as a result of new

above ground infrastructure. These positive landscape features have the potential to be impacted by the existence of the Hydrogen Pipeline depending upon the pipeline laying method.

- 6.7.70 The Proposed Development Site is not located within a nationally designated landscape and does not otherwise constitute a valued landscape. However, given the scale of the proposed Hydrogen Pipeline, changes to the character of the Proposed Development Site could be significant. Operation impacts of the proposed Hydrogen Pipeline on the Proposed Development Site are therefore proposed to be **Scoped In** to the LVIA.

Visual amenity

- 6.7.71 Table 6.37 below considers the implications of the proposed Hydrogen Pipeline(s) at operation on each identified visual receptor.

Table 6.37: Potential operation impacts of Hydrogen Pipeline on visual receptors

Visual Receptor	Commentary (Refer to Table 6.36 for baseline commentary)
Motorists along major highways between Hartlepool and Redcar (A178, A1185, A1085)	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of motorists along major highways between Hartlepool and Redcar. Operation impacts of the proposed Hydrogen Pipeline on these motorists are therefore proposed to be Scoped Out of the LVIA.
Motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane)	It is considered that the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of motorists along local highways. Operation impacts of the proposed Hydrogen Pipeline on these motorists are therefore proposed to be Scoped In to the LVIA.
Recreational users of the King Charles III England Coast Path between Hartlepool and Redcar	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of recreational users of the King Charles III England Coast Path between Hartlepool and Redcar. Operation impacts of the proposed Hydrogen Pipeline on these public footpath users are therefore proposed to be Scoped Out of the LVIA.
Recreational users of NCN Route 14 around Hartlepool Bay	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Operation impacts of the proposed Hydrogen Pipeline on these cyclists are therefore proposed to be Scoped Out of the LVIA.
Recreational users of NCN Route 65 around Middlesbrough Dock	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of recreational users of the NCN Route 14 around Hartlepool Bay. Operation impacts of the proposed Hydrogen Pipeline on these cyclists are therefore proposed to be Scoped Out of the LVIA.

Visual Receptor	Commentary (Refer to Table 6.36 for baseline commentary)
Residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heagh)	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of residents at the eastern edge of Hartlepool. Operation impacts of the proposed Hydrogen Pipeline on these residents are therefore proposed to be Scoped Out of the LVIA.
Residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley)	It is considered that the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of residents at the northern edge of Middlesbrough. Operation impacts of the proposed Hydrogen Pipeline on these residents are therefore proposed to be Scoped In to the LVIA.
Visitors to Teesmouth NNR	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to Teesmouth NNR. Operation impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to Saltholme Nature Reserve	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to Saltholme Nature Reserve. Operation impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to Cowpen Bewley Woodland Park	It is considered that the proposed Hydrogen Pipeline could result in significant changes to the visual amenity of visitors to Cowpen Bewley Woodland Park. Operation impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped In to the LVIA.
Visitors to the Teesdale Way Viewpoint along the South Gare Breakwater	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to Teesdale Way Viewpoint. Operation impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the River Tees Viewpoint along the southern riverside	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to River Tees Viewpoint. Operation impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.
Visitors to the Eston Beacon within the North York Moors National Park	It is considered that the proposed Hydrogen Pipeline would not result in significant changes to the visual amenity of visitors to Eston Beacon. Operation impacts of the proposed Hydrogen Pipeline on these visitors are therefore proposed to be Scoped Out of the LVIA.

Hydrogen Pipeline – decommissioning

- 6.7.72 It is assumed that the landscape and visual effects associated with the decommissioning phase of the Hydrogen Pipeline would arise from the removal of above-ground structures and associated ground remediation works. It is considered that these impacts will not exceed those reported for construction at section 6.7.51, and therefore the same landscape and visual

receptors are proposed to be **Scoped In/ Out** of the LVIA as identified for the construction.

Embedded Mitigation

6.7.73 The detailed design and evolution of the Proposed Development is ongoing and as such the mitigation requirements will be evaluated through the LVIA to reduce any LSE through design, as far as reasonably practicable. Key areas of embedded mitigation being considered include:

- Choice of Hydrogen Pipeline construction and crossing techniques, particularly in more sensitive areas and consideration of maximum working widths for open-cut pipeline and trenchless crossings.
- Siting and routing e.g. seeking to avoid or reduce effects on more sensitive landscape features such as woodland, including protected or mature tree specimens within Cowpen Bewley Woodland Park. Limiting the proximity of the Hydrogen Pipeline to settlement and residential properties.
- Working methods e.g. using soil storage as screening where required, sequential phasing to limit the extent of works at any one time and planting to reinstate sections of hedgerow or trees removed during the construction stage of the Proposed Development.
- Employing standard good practice construction techniques, such as minimising vegetation clearance, installing tree protection measures around retained trees and hedgerows.
- Reinstatement of agricultural land such that there is no long-term change in land use along the Hydrogen Pipeline where agricultural land is affected.
- Use of planting to integrate permanent structures e.g. AGI into the landscape to minimise visual impacts.

6.7.74 These mitigation measures will be embedded within the final design proposal and confirmed in the ES. An Outline LBMEP will accompany the Application.

Summary of Potential Likely Significant Effects

6.7.75 Table 6.38 below summarises the landscape and visual receptors proposed to be **Scoped In** or **Scoped Out** of the EIA.

Table 6.38: Landscape and Visual elements scoped in or out of future EIA

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility				
Changes to key characteristics of NCA 23: Tees Lowlands	Construction Operation Decommissioning		✓	The local landscape is largely influenced by existing industrial development and given the relative scale of the proposed HPF to the identified NCA, any effects from changes are unlikely to be significant.
Changes to key characteristics of East Billingham to Teesmouth LCA	Construction Operation Decommissioning		✓	The local landscape is largely influenced by existing industrial development and has been identified in the published LCA for Stockton-on-Tees as being dominated by industrial features and hardstanding in poor condition. Given the proximity and similarities between the proposed HPF and the surrounding industrial development, any effects from changes are unlikely to be significant.
Changes to physical landscape features and overall character of the Proposed Development Site	Construction Operation Decommissioning	✓		The Proposed Development Site is largely absent of built form so given the potential scale of the proposed HPF and associated construction and decommissioning works, changes to the character of the Proposed Development Site have the potential to be significant.
Changes to views experienced by motorists along major highways between Hartlepool and Redcar (A178, A1185, A1085)	Construction Operation Decommissioning		✓	In these views, the proposed HPF and the associated construction would typically be experienced in context with industrial buildings and structures including tall industrial stacks and flare stacks, and in a relatively busy landscape so any effects from are unlikely to be significant.

Element	Phase	Scoped In	Scoped Out	Justification
Changes to views experienced by motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane)	Construction Operation Decommissioning		✓	As above
Changes to views experienced by recreational users of the King Charles III England Coast Path between Hartlepool and Redcar	Construction Operation Decommissioning		✓	As above
Changes to views experienced by recreational users of NCN Route 14 around Hartlepool Bay	Construction Operation Decommissioning		✓	As above
Changes to views experienced by recreational users of NCN Route 65 around Middlesbrough Dock	Construction Operation Decommissioning		✓	As above
Changes to views experienced by residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heagh)	Construction Operation Decommissioning		✓	As above
Changes to views experienced by residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley)	Construction Operation Decommissioning		✓	As above
Changes to views experienced by visitors to Teesmouth NNR	Construction Operation Decommissioning		✓	As above
Changes to views experienced by visitors to	Construction Operation		✓	As above

Element	Phase	Scoped In	Scoped Out	Justification
Saltholme Nature Reserve	Decommissioning			
Changes to views experienced by visitors to Cowpen Bewley Woodland Park	Construction Operation Decommissioning		✓	As above
Changes to views experienced by visitors to the Teesdale Way Viewpoint along the South Gare Breakwater	Construction Operation Decommissioning		✓	As above
Changes to views experienced by visitors to the River Tees Viewpoint along the southern riverside	Construction Operation Decommissioning		✓	As above
Changes to views experienced by visitors to the Eston Beacon within the North York Moors National Park	Construction Operation Decommissioning		✓	As above
Hydrogen Pipeline(s)				
Changes to key characteristics of NCA 23: Tees Lowlands	Construction Operation Decommissioning		✓	The local landscape is largely influenced by existing industrial development and given the relative scale of the proposed Hydrogen Pipeline(s) to the identified NCA, any changes are unlikely to be significant.
Changes to key characteristics of Redcar and Cleveland LCA	Construction Operation Decommissioning		✓	The local landscape is largely influenced by existing industrial development and given the relative scale of the proposed Hydrogen Pipeline(s) to the identified NCA, any changes are unlikely to be significant.
Changes to key characteristics of	Construction Operation Decommissioning	✓		The eastern leg of the Hydrogen Pipeline crosses scrubby pasture and

Element	Phase	Scoped In	Scoped Out	Justification
East Billingham to Teesmouth LCA				established woodland around Cowpen Bewley, which is otherwise rare in this landscape. Given the potential scale of the proposed Hydrogen Pipeline(s) and associated construction and decommissioning works, changes to the identified LCA have the potential to be significant.
Changes to physical landscape features and overall character of the Site	Construction Operation Decommissioning	✓		Given the potential scale of the proposed Hydrogen Pipeline(s) and associated construction and decommissioning works, changes to the character of the Proposed Development Site have the potential to be significant.
Changes to views experienced by motorists along major highways between Hartlepool and Redcar (A178, A1185, A1085)	Construction Operation Decommissioning		✓	In these views, the proposed Hydrogen Pipeline(s) and the associated construction would typically be screened or experienced as a very small feature in context with existing industrial buildings and structures, so any changes are unlikely to be significant.
Changes to views experienced by motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane)	Construction Operation Decommissioning	✓		Given the potential scale of the proposed Hydrogen Pipeline(s) and associated construction and decommissioning works, changes in these views have the potential to be significant.
Changes to views experienced by recreational users of the King Charles III England Coast Path between Hartlepool and Redcar	Construction Decommissioning	✓		Given the potential scale of construction and decommissioning works associated with the proposed Hydrogen Pipeline(s), changes in these views have the potential to be significant.
	Operation		✓	In these views, the proposed Hydrogen Pipeline(s) would typically be screened or

Element	Phase	Scoped In	Scoped Out	Justification
				experienced in context with existing above ground pipelines and associated infrastructure, so changes are unlikely to be significant.
Changes to views experienced by recreational users of NCN Route 14 around Hartlepool Bay	Construction Operation Decommissioning		✓	In these views, the proposed Hydrogen Pipeline(s) and the associated construction would typically be screened or experienced as a very small feature in context with existing industrial buildings and structures, so changes are unlikely to be significant.
Changes to views experienced by recreational users of NCN Route 65 around Middlesbrough Dock	Construction Operation Decommissioning		✓	As above
Changes to views experienced by residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heagh)	Construction Operation Decommissioning		✓	As above.
Changes to views experienced by residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley)	Construction Operation Decommissioning	✓		Given the potential scale of the proposed Hydrogen Pipeline(s) and associated construction and decommissioning works, changes in these views have the potential to be significant.
Changes to views experienced by visitors to Teesmouth NNR	Construction Operation Decommissioning		✓	In these views, the proposed Hydrogen Pipeline(s) and the associated construction would typically be screened or experienced as a very small feature in context with existing industrial buildings and structures, so changes are unlikely to be significant.

Element	Phase	Scoped In	Scoped Out	Justification
Changes to views experienced by visitors to Saltholme Nature Reserve	Construction Decommissioning	✓		Given the potential scale of construction and decommissioning works associated with the proposed Hydrogen Pipeline(s), changes in these views have the potential to be significant.
	Operation		✓	Given the abundance of intervening vegetation in and around the Nature Reserve, changes in these views resulting from the existence and operation of the proposed Hydrogen Pipeline(s) are unlikely to be significant.
Changes to views experienced by visitors to Cowpen Bewley Woodland Park	Construction Operation Decommissioning	✓		Given the potential scale of the proposed Hydrogen Pipeline(s) and associated construction and decommissioning works, changes in these views are likely to be significant.
Changes to views experienced by visitors to the Teesdale Way Viewpoint along the South Gare Breakwater	Construction Operation Decommissioning		✓	In these views, the proposed Hydrogen Pipeline(s) and the associated construction would typically be screened or experienced as a very small feature in context with existing industrial buildings and structures, so changes are unlikely to be significant.
Changes to views experienced by visitors to the River Tees Viewpoint along the southern riverside	Construction Operation Decommissioning		✓	as above
Changes to views experienced by visitors to the Eston Beacon within the North York Moors National Park	Construction Operation Decommissioning		✓	as above

Proposed Assessment Methodology

- 6.7.76 The proposed assessment methodology that will be used to undertake the landscape and visual assessment within the ES is set out within Appendix G: Landscape and Visual Amenity Impact Assessment Methodology (Volume II).

Assumptions, Limitations and Uncertainties

- 6.7.77 The following limitations and assumptions have been identified:
- The LVIA baseline appraisal is based on the baseline conditions observed at the time of the site survey in March 2024 and additional desktop information noted in the introduction of this section.
 - The scope of photography and requirements for supporting visualisations will be confirmed as part of the consultation process.
 - A full LVIA has not yet been undertaken. Once a formal Scoping Opinion has been received, and any changes to the scope approved, the formal assessment of effects will be prepared.
 - The LVIA will make judgements based on a worst-case scenario i.e. assuming clear weather conditions and little to no foliage on vegetation.
- 6.7.78 There is limited design information available at the time of writing the EIA Scoping Report. The assessment within the ES will be in-line with the latest available design information at the time of submission. Where design information is unknown or unavailable, worst-case assumptions will be made in accordance with Rochdale Envelope principles.

6.8 Marine Biodiversity

Overview

- 6.8.1 This section sets out the proposed scope for assessment of effects of the Proposed Development on Marine Biodiversity. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.8.2 This Section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development and Section 6.2: Biodiversity of this EIA Scoping Report and is supported by the following figures (Appendix A) and appendix (Volume II):
- Figure 3.1: Indicative Site Layout;
 - Figure 6.8.1: Marine Biodiversity;

- Appendix E: Biodiversity Desk Study; and
- Appendix H: Marine Biodiversity – Underwater Noise and Vibration Technical Appendix.

6.8.3 The works carried out in relation to the Hydrogen Pipeline (east) and Effluent Connection Corridor which would occur within the River Tees (herein referred to as ‘River Tees crossing’) and works at Greatham Creek to install a new outfall (herein referred to as the ‘Wastewater Connection Corridor outfall’) (described in Section 3.2) that could occur below MHWS are collectively referred to as ‘in-river works’ in this Section. Any works above MHWS are considered in Section 6.2: Biodiversity.

6.8.4 For the purposes of this section, the following marine biodiversity receptor groups have been considered:

- fish and shellfish;
- benthic intertidal and estuarine environment; and
- marine mammals.

Legislation, Policy and Guidance Context

6.8.5 Table 6.39 outlines the legislation, policy and guidance that has been considered in relation to the marine environment.

Table 6.39: Legislation, policy and guidance

Guidance/Legislation	Relevance to the Assessment	Geographic coverage
The Convention on the Conservation of Migratory Species of Wild Animals (the ‘Bonn Convention’) ²²⁴	Aims to conserve migratory species and their habitats by providing strict protection for endangered migratory species (Appendix I of the Convention) and lists migratory species which benefit from multilateral agreements for conservation and management (Appendix II of the Convention). Potential effects on marine mammals and fish protected by the Convention will be considered in the ES.	International
The Convention on the Conservation of European Wildlife and Natural Habitats (the ‘Bern Convention’) ²²⁵	Aims to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I, II and III of the Convention). Potential effects on marine mammals and fish protected by the Convention will be considered in the ES.	International

²²⁴ United Nations Environment Programme (1983) The Convention on the Conservation of Migratory Species of Wild Animals.

²²⁵ Council of Europe (1979) The Convention on the Conservation of European Wildlife and Natural Habitats.

Guidance/Legislation	Relevance to the Assessment	Geographic coverage
The OSPAR Convention ²²⁶	The Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention) will be implemented through OSPAR's North-East Atlantic Environment Strategy 2030. Annex V indicates a list of threatened and/or declining species and habitats which will be considered in the ES, where relevant.	International
European Commission Directive 2009/147/EC (codified version of 79/409/EC) on the Conservation of Wild Birds (the 'Birds Directive') ⁸²	The Birds Directive aims to conserve all wild bird species naturally occurring in the EU by establishing rules for their protection, conservation, management, and control ¹ . This includes the protection of birds, their eggs, nests, and habitats. The UK has transposed the land and marine aspects of the Birds Directive into the Conservation of Habitats and Species Regulations 2017 (as amended) ('Habitats Regulations').	Europe
European Commission Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (known as the 'Habitats Directive') ⁸¹ .	The Habitat Regulations list Annex I habitats and Annex II species. These habitats and species can be designated features of SAC. All cetaceans in Northern European waters are listed under Annex IV of the Habitats Directive as European Protected Species (EPS) of community interest and in need of strict protection.	Europe
EU Directive 2008/56/EC Marine Strategy Framework Directive ²²⁷ (transposed as the Marine Strategy Regulations 2010 (SI No. 1627))	The Marine Strategy Framework Directive sets out measures for Good Environmental Status in the marine environment.	Europe
Council Regulation (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel. (Amendment) (EU Exit) Regulations 2018 ²²⁸	Establishes a framework for the protection and sustainable use of the stock of European eel.	Europe
The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019	This statutory instrument was enacted to ensure that the habitat and species protection standards set out under the EU Nature Directives are implemented in the same way or an equivalent way when the UK exits the EU.	National (England)

²²⁶ OSPAR Commission (1992) Convention for the Protection of the Marine Environment of the North-East Atlantic.

²²⁷ European Parliament (2008) Directive 2008/56/EC Marine Strategy Framework Directive.

²²⁸ European Commission (2007) Regulation 1100/2007 Establishing measures for the recovery of the stock of European eel.

Guidance/Legislation	Relevance to the Assessment	Geographic coverage
Natural Environment and Rural Communities Act 2006	The Natural Environment and Rural Communities (NERC) Act 2006 was enacted to make provision about bodies concerned with the natural environment and rural communities. The Act led to a reorganization of public bodies involved in rural policy and delivery, dissolving English Nature, the Countryside Agency, and the Rural Development Service, and establishing Natural England. Key provisions of the Act include to place a duty to conserve biodiversity on public authorities in England; and requires the SoS to publish and maintain lists of species and types of habitats which are regarded by Natural England to be of "principal importance" for the purposes of conserving biodiversity in England. The Act also includes provisions related to wildlife, sites of special scientific interest, National Parks, and the Broads.	National (UK)
MCAA (2009) ¹³	Establishes provisions for the management and protection of the marine environment.	National (UK)
WCA 1981 (as amended) ⁷⁷	The act makes it an offence to intentionally (or recklessly) kill, injure or take any wild animal listed on Schedule 5 of the Act, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. All cetacean species are protected within the 12 nm territorial waters under Schedule 5 of the WCA.	National (UK)
The Marine Works (Environmental Impact Assessment) Regulations (2017) ¹⁵	Establishes the requirement for EIA in relation to marine works in England.	National (UK)
UK Marine Policy Statement ²⁸	Provides the policy framework for the marine planning system.	National (UK)
North East Inshore and North East Offshore Marine Plan ²⁹	Guides sustainable development in the coastal and offshore waters of the north east region. It provides a framework for managing activities such as fishing, aquaculture, energy production, and conservation, ensuring a balance between economic growth and environmental protection.	North east England

Guidance/Legislation	Relevance to the Assessment	Geographic coverage
Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects ²²⁹	This peer-reviewed publication provides information on functional hearing groups of marine mammals. Auditory thresholds are presented at which underwater noise levels can cause a temporary threshold shift in hearing, meaning hearing is temporarily affected, or a permanent threshold shift, where hearing is permanently affected. These values are typically used in conjunction with underwater noise modelling to assess the effect on species at the individual and population level.	International
Joint Nature Conservation Committee (JNCC) guidelines for minimising the risk of injury to marine mammals from piling noise ²³⁰	This set of mitigation measures offers guidance on reducing risk of injury to marine mammals during pile driving. If followed, risk of injury is likely to be greatly reduced.	National (UK)
The Conservation of Seals (England) Order 1999	The Conservation of Seals (England) Order 1999 is a statutory instrument of the UK government. It prohibits the killing, injuring, or taking of grey seals and common seals in the counties of England bordering the North Sea and the adjacent territorial waters. Any person who acts in contravention of this Order is guilty of an offence under section 3 (2) of the Conservation of Seals Act 1970.	National (UK)
The Conservation of Seals Act 1970 (as amended)	The Conservation of Seals Act 1970 is an act of the Parliament of the United Kingdom, enacted to provide for the protection and conservation of seals in England and Wales, as well as in the adjacent territorial waters. It includes provisions on prohibited methods of killing seals, close seasons for seals, and powers of search and seizure for suspected offences under the Act.	National (UK)
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 ²³¹	The Water Environment Regulations 2017 provides a framework for managing the water environment. A RBMP is required to be produced for each district, including environmental objectives and measures advised to achieve these.	England and Wales

²²⁹ Southall, B. et al. (2019) Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Available at: <https://www.aquaticmammalsjournal.org/article/vol-45-iss-2-southall/>. [Accessed 22/01/2025].

²³⁰ Joint Nature Conservation Committee (2017) Guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines). Available at: <https://hub.jncc.gov.uk/assets/e2a46de5-43d4-43f0-b296-c62134397ce4> [Accessed 22/01/2025].

²³¹ UK Government (2017) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

Guidance/Legislation	Relevance to the Assessment	Geographic coverage
Nutrient Neutrality and Nutrient Mitigation Scheme ²³²	The Nutrient Neutrality and Nutrient Mitigation Scheme seeks to mitigate for any increase in pollution is offset by mitigation resulting in reduced pollution within the same area. Delivery of nutrient mitigation in areas affected by pollution generate nutrient credits for developers to purchase in order to discharge obligations under the Habitats Regulations.	Teesmouth and Cleveland Coast catchment (at the time of writing)
Chartered Institute for Ecology and Environmental Management (CIEEM): Guidelines for Ecological Impact Assessment in the UK and Ireland ⁹¹ .	This publication aims to promote good practice in relation to EclA. It includes relevant information on how to evaluate likely ecological effects of a project, how to apply out a scientifically rigorous and transparent approach to impact assessment, and a common framework for EclA.	UK and Ireland.
The Environment Act 2021	The Act is relevant as it sets legally binding targets and policies for improving the natural environment, including marine ecosystems. The Act mandates the restoration of marine protected areas, enhancement of biodiversity, and reduction of pollution, which are critical considerations for assessing the potential impacts of marine developments. Additionally, the Act's requirements for public consultation and the involvement of the Office for Environmental Protection ensure that marine ecology is thoroughly evaluated and protected in line with national environmental objectives	UK
The Salmon and Freshwater Fisheries Act 1975	The Act is relevant as it protects fish species, regulates fishing practices, conserves habitats, and controls pollution. These measures ensure sustainable fishing, maintain biodiversity, and protect water quality, which are essential for the health of marine and freshwater ecosystems.	England and Wales

Consultation

- 6.8.6 As described in paragraph 2.5.5 initial engagement with the MMO commenced in 2024 in relation to impacts on the marine environment. Consultation and additional technical engagement with the MMO will continue where relevant, as the design of the Proposed Development evolves.

²³² Natural England (2022) Nutrient Neutrality and Mitigation: A summary guide and frequently asked questions (NE776). Available at: <https://publications.naturalengland.org.uk/publication/6248597523005440> [Accessed 22/01/2025].

Baseline Conditions and Receptors

Study area

- 6.8.7 The study area for marine biodiversity is defined by the likely Zol²³³ of the Proposed Development, taking into consideration the mobility of marine receptors and potential impact pathways to these receptors, considering Rochdale Envelope principles (i.e. worst-case scenarios relating to in-river works).
- 6.8.8 An initial desk-based baseline assessment has been undertaken to gather information on existing marine biodiversity to inform the study area. The potential impact pathways have been assessed considering the Proposed Development footprint below MHWS described in paragraph 6.8.3 (i.e. within the River Tees and Greatham Creek) and illustrated on Figure 6.8.1 (Appendix A). An initial 2 km Zol was considered appropriate based on best practice and professional judgement considering the relatively small scale of any in-river works likely to take place below MHWS within either an existing tunnel, alternative River Tees crossing or Wastewater Connection Corridor outfall. Assumptions in relation to in-river works are set out in paragraphs 6.8.62 - 6.8.64.
- 6.8.9 The MAGIC online database was reviewed in March 2024 to identify the following designations and habitats within the 2 km Zol of the Proposed Development Site:
- international statutory designations, including, SPA, SAC and Ramsar Sites;
 - national statutory designations, including SSSI, NNR, MCZ and HPMA;
 - local statutory designations, including LNR; and
 - priority habitats designated under the UK BAP list.
- 6.8.10 Records of protected and notable species within the Zol of the River Tees crossing were initially obtained by Ecus Ltd on behalf of the Applicant from the National Biodiversity Network (NBN) Gateway. The UK BAP list was then consulted to identify any species or habitats found within the Zol that are protected under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. BoCC was also consulted to assist in assessing the Proposed Development Zol value in relation to birds.

²³³ Zone of Influence refers to the specific geographic area where the impacts of a project or activity are assessed

Existing Baseline - Designated Sites

Highly Protected Marine Areas

- 6.8.11 There are no HPMA located within or surrounding the study area for the Proposed Development. The nearest HPMA is located approximately 90 km north-east: the North East of Farnes Deep HPMA.

Special Areas of Conservation

- 6.8.12 There are no SAC with marine components located within or surrounding the study area for Proposed Development.

Special Protection Areas

- 6.8.13 The proposed River Tees crossing and the Wastewater Connection Corridor outfall are located within the Teesmouth and Cleveland SPA and encompass marine components. As noted in Table E1 of Appendix E (Volume II) the SPA regularly supports more than 1% of the Great Britain populations of the following species listed in Annex I of the EC Birds Directive; pied avocet (*Recurvirostra avosetta*), sandwich tern (*Thalasseus sandvicensis*), common tern (*Sterna hirundo*), little tern (*Sternula albifrons*) and ruff (*Calidris pugnax*). It regularly supports more than 1% of the biogeographic population of two regularly occurring migratory species not listed in Annex I of the EC Birds Directive; red knot (*Calidris canutus*) and common redshank (*Tringa totanus*). It is also regularly used by over 20,000 waterfowl (waterfowl as defined by the Ramsar Convention) or 20,000 seabirds in any season.

Ramsar sites

- 6.8.14 The proposed River Tees crossing and the Wastewater Connection Corridor outfall are located within the Teesmouth and Cleveland Ramsar site. As noted in Table E1 of Appendix E (Volume II) the site qualifies under Ramsar criterion 5 as it is regularly used by over 20,000 waterbirds in any season. The site qualifies under criterion 6 as it is regularly used by 1% or more of the biogeographic populations of the following bird species in any season; red knot, common redshank, and sandwich tern.

Sites of Special Scientific Interest

- 6.8.15 SSSI refer to areas which have been provided UK statutory protection for flora, fauna, geological or physiographical features. The SSSI designation may extend into intertidal areas, which then falls within the jurisdiction of the MMO. Should an activity be proposed within or near an SSSI and have the potential to impact it, a ML may be needed.
- 6.8.16 The proposed River Tees crossing is located within the Teesmouth and

Cleveland SSSI. The SSSI includes seven previous SSSI which were expanded to create a single, landscape scale SSSI comprising of 3000 hectares. As noted in Table E1 of Appendix E (Volume II) the Teesmouth and Cleveland SSSI is of special interest for a number of nationally important features that occur within the Proposed Development Site boundary and are supported by the wider mosaic of coastal and freshwater habitats:

- Jurassic and Quaternary geology;
- sand dunes and saltmarshes;
- a diverse assemblage of invertebrates associated with sand dunes;
- breeding harbour seals (*Phoca vitulina*);
- a diverse assemblage of breeding birds, sand dunes, saltmarsh and lowland open waters and their margins;
- an assemblage of more than 20,000 waterbirds during the non-breeding season;
- breeding avocet, little tern and common tern; and
- non-breeding shelduck (*Tadorna tadorna*), shoveler (*Spatula clypeata*), gadwall (*Mareca strepera*), ringed plover (*Charadrius hiaticula*), knot, ruff, sanderling (*Calidris alba*), purple sandpiper (*Calidris maritima*), redshank and sandwich tern.

Marine Conservation Zone

- 6.8.17 There are no MCZ within the study area. The nearest MCZ, Runswick Bay, is located approximately 25 km south-east.

National Nature Reserve

- 6.8.18 The Wastewater Connection Corridor outfall intersects with Teesmouth NNR²³⁴, which is designated for the presence of sand dunes, grazing marsh, intertidal salt flats, harbour seals and grey seals, marsh orchids and migratory waterbirds as noted in Table E2 of Appendix E (Volume II). This NNR is approximately 1 km north-east of the elements of the proposed River Tees crossing.

Existing Baseline – Marine and Intertidal Habitats

Intertidal Mudflats

- 6.8.19 Priority habitats of intertidal mudflats are located along the shoreline of the

²³⁴ Natural England (2014). Teesmouth National Nature Reserve. Available at <https://www.gov.uk/government/publications/cleveland-national-nature-reserves/cleveland-national-nature-reserves#teesmouth>. [Accessed 22/01/2025].

River Tees and Dabholm Cut, which the River Tees crossing location intersects and runs adjacent to before reaching coastal sand dunes north-west of Warrenby Industrial Estate (see Figure 6.8.1 – Appendix A). Mudflats are also present along Greatham Creek, with the nearest parcel approximately 50 m north-west of the proposed Wastewater Connection Corridor outfall location. These are priority habitats according to the UK BAP and form some of the qualifying features for the Teesmouth and Cleveland Coast SSSI.

- 6.8.20 Intertidal mudflats, as described in UK BAP Priority Habitat Description²³⁵ are ‘sedimentary intertidal habitats created by deposition in low energy coastal environments, particularly estuaries and other sheltered areas. Their sediment consists mostly of silts and clays with a high organic content’. Such habitats dissipate energy from estuarine and tidal flows, thereby providing protection for habitats such as saltmarsh. Organic sediments within mudflats are an important tool for reducing pollution impacts to receiving waterbodies, by sequestering contaminants which could contain heavy metals.
- 6.8.21 This habitat type supports a variety of species within the marine environment as well as avian species, such as waders and waterfowl which are designated as part of the Teesmouth and Cleveland SPA/ Ramsar/ SSSI. Multiple species of oligochaete worms, polychaete worms, bivalve molluscs and shrimp species burrow within the mudflat and are integral to the food chain for several species. Additionally, they serve as important breeding grounds for species including common cockle (*Cerastoderma edule*) and ragworm (*Hediste diversicolor*) and consequently for juvenile fish species including plaice (*Pleuronectes platessa*) as a nursery ground.

Coastal Saltmarsh

- 6.8.22 Coastal saltmarsh, another priority UK BAP, is located approximately 1.6 km downstream of the River Tees crossing, as well as slightly overlapping with the Wastewater Connection Corridor outfall south of Greatham Creek. Extensive areas of this habitat are present further upstream within Greatham Creek, above the intertidal mudflats. A feature typically found above intertidal mudflats, they sit between mean high-water neap (MHWN) tides and MHWS tides. The development of coastal saltmarsh is generally intertwined with the presence of mudflats, whereby the mudflat acts as an erosion barrier and allows for the slow development of a saltmarsh. Plant species are halophytic i.e. salt tolerant, adapted to the

²³⁵ Joint Nature Conservation Committee (2008) UK Biodiversity Action Plan Priority Habitat Descriptions. Intertidal Mudflats. Available at: <https://data.jncc.gov.uk/data/6e4e3ed1-117d-423c-a57d-785c8855f28c/UKBAP-BAPHabitats-22-IntertidalMudflats.pdf> [Accessed 22/01/2025].

daily fluctuations in salinity from the rise and fall of tides and brackish nature of estuarine areas.

- 6.8.23 The habitat is represented by zonation of vegetation communities, those nearest the water edge more tolerant to salinity and temperature fluctuations, whilst those furthest away from the water are less tolerant. Saltmarsh species of glasswort *Salicornia* spp. grows along the lower edges of the habitat, tolerant to immersion whilst the upper areas of the marsh are less adapted to inundation, and typically represented by species such as sea aster (*Aster tripolium*), cordgrass (*Spartina alterniflora*), golden samphire (*Limbarda crithmoides*) and sea beet (*Beta vulgaris subsp. maritima*).
- 6.8.24 Multiple species are supported by coastal saltmarsh, attracting a variety of bird species including those which are the qualifying features of the nearby SPA, Ramsar and SSSI. Wader species including curlew, ringed plover and lapwing are known to forage within coastal saltmarsh. Within the water channels running through the saltmarsh, crustaceans such as shore crab (*Carcinus maenas*), fish species including bass (*Dicentrarchus labrax*) and a variety of insect life including the starwort moth (*Cucullia asteris*) can be found.
- 6.8.25 Coastal saltmarsh national vegetation communities (NVC) of SM8 Annual *Salicornia* saltmarsh community, SM9 *Suaeda maritima* saltmarsh community, SM10 Transitional low-marsh vegetation with *Puccinellia maritima*, annual *Salicornia* species and *Suaeda maritima* are noted as present at the Seal sands peninsula saltmarsh²³⁶. At Greatham North, adjacent to Seal sands, both communities of SM8 Annual *Salicornia* saltmarsh community and SM9 *Suaeda maritima* saltmarsh community are noted as present. Greatham creek supports saltmarsh communities of SM8 Annual *Salicornia* saltmarsh community, SM9 *Suaeda maritima* saltmarsh community, SM13a *Puccinellia maritima* salt-marsh community, subcommunity with *Puccinellia maritima* dominant, SM13c *Puccinellia maritima* saltmarsh, *Limonium vulgare* - *Armeria maritima* sub-community, SM24 *Elymus pycnanthus* salt-marsh community and SM28 *Elymus repens* saltmarsh community.

Coastal Sand Dunes

- 6.8.26 Coastal sand dunes, which form some of the qualifying features for the Teesmouth and Cleveland Coast SSSI, are located approximately 2.3 km downstream of the River Tees crossing location and 2.5 km downstream of

²³⁶ Joint Nature Conservation Committee (2008) UK Biodiversity Action Plan Priority Habitat Descriptions. Coastal Saltmarsh. Available at: <https://data.jncc.gov.uk/data/6e4e3ed1-117d-423c-a57d-785c8855f28c/UKBAP-BAPHabitats-08-CoastSaltmarsh.pdf> [Accessed 22/01/2025].

the Wastewater Connection Corridor outfall. This is located at Seal Sands and North Gare Sands. Encompassing a variety of sand dune types, this priority habitat forms part of the 180 sand dune habitat across the Tees Bay Dune system. The physical, climatic and coastal processes within the north-east of England have influenced the creation of the sand dune systems, from their topography and their vegetation.

- 6.8.27 The North Gare breakwater has influenced the development of the sand dunes, with frontal dunes at the mouth of the Teesmouth, flanked by white dunes and with stable dune grassland occupying the landward side of the sand dune system. Sand dunes can support a variety of species including those which are designated for the Teesmouth and Cleveland Coast SPA, Ramsar and SSSI.
- 6.8.28 Sand dune NVC of SD4 *Elymus farctus* ssp. *boreali-atlanticus* foredune community, SD5 *Leymus arenarius* mobile dune community, SD6 *Ammophila arenaria* mobile dune community, SD7 *Ammophila arenaria* - *Festuca rubra* semi-fixed dune community, SD8 *Festuca rubra* - *Galium verum* fixed dune grassland and SD9 *Ammophila arenaria* – *Arrhenatherum elatius* dune grassland are noted as present at Seal Sands²³⁷.
- 6.8.29 Whilst sand dunes may not occupy the marine sphere, they are influenced by coastal processes and are therefore included within this section.

Saline Lagoons

- 6.8.30 Saline lagoons, another priority UK BAP, is located approximately 375 m west of the Wastewater Connection Corridor outfall, associated with a tributary of Greatham Creek.
- 6.8.31 Saline lagoons, as described in the UK BAP Priority Habitat Description²³⁸, are “essentially bodies, natural or artificial, of saline water partially separated from the adjacent sea. They retain a proportion of their seawater at low tide and may develop as brackish, full saline or hyper-saline water bodies...Lagoons can contain a variety of substrata, often soft sediments which in turn may support tasselweeds and stoneworts as well as filamentous green and brown algae.”
- 6.8.32 Multiple species are supported by saline lagoons, including specialist invertebrates and plants, as well as waterfowl, marshland birds, and

²³⁷ Natural England (2018). Teesmouth and Cleveland Coast SSSI. Supporting Information A supplement to the notification document. Available at https://consult.defra.gov.uk/natural-england-marine/teesmouth-and-cleveland-coast-potential-sp/supporting_documents/Teesmouth%20and%20Cleveland%20Coast%20SSSI%20%20Supporting%20information.pdf. [Accessed 22/01/2025].

²³⁸ Joint Nature Conservation Committee (2008) UK Biodiversity Action Plan Priority Habitat Descriptions. Saline Lagoons. Available at: <https://data.jncc.gov.uk/data/c9721550-e422-4181-805d-2a0b58afa9d7/UKBAP-BAPHabitats-48-SalineLagoons.pdf> [Accessed 22/01/2025].

seabirds, including those which are the qualifying features of the nearby SPA, Ramsar and SSSI. Avian species known to use saline lagoon habitats include teal, curlew, knot, redshank, shelduck, and cormorant.

- 6.8.33 Biotopes relevant to saline lagoons include submerge fucoids, green or red seaweeds; sublittoral sand in low or reduced salinity; sublittoral mud in low or reduced salinity; sublittoral mixed sediment in low or reduced salinity; and angiosperm communities in reduced salinity.

Coastal and Floodplain Grazing Marsh

- 6.8.34 Extensive areas of coastal and floodplain grazing marsh, a UK BAP, are present north and west of the proposed Wastewater Connection Corridor outfall, including within Teesmouth NNR. The nearest parcel is approximately 115 m north of the proposed outfall into Greatham Creek.
- 6.8.35 As described by the BAP description, this habitat type is defined as *“periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. The ditches are especially rich in plants and invertebrates. Almost all areas are grazed and some are cut for hay or silage. Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities, but not extensive areas of tall fen species like reeds.”*
- 6.8.36 This habitat is noted to be of particular important for supporting breeding waders, including snipe *Gallinago gallinago*, lapwing *Vanellus vanellus*, and curlew *Numenius arquata*. Wintering species supported by this habitat type include Bewick swans *Cygnus bewickii* and whooper swans *Cygnus cygnus*.
- 6.8.37 Whilst not located within the marine environment itself, the habitat is located immediately adjacent to Greatham Creek and is influenced by works within the marine habitat. As such, this habitat is considered within this section.

Existing Baseline – Notable Marine Flora

- 6.8.38 There are no desk-based records of notable marine flora present within the study area. Records from NBN Atlas²³⁹ identify species of brown and green algae including sea lettuce (*Ulva fenestrata*), green laver (*Porphyra* sp.), sea emerald (*Chaetomorpha* sp.) and filamentous brown algae within the ZOI (see paragraph 6.8.10). Such species are habituated to busy ports and harbours, thriving in a range of conditions including fluctuations in temperatures, salinity and nutrient concentrations. No records were returned from NBN Atlas for within the area of the Wastewater Connection Corridor outfall.

²³⁹ NBN Atlas (n.d). Available at: <https://nbnatlas.org/> [Accessed 22/01/2025].

Existing Baseline – Notable Fauna

Large Pelagic Animals

- 6.8.39 All marine cetaceans (whales, dolphins, porpoise) are EPS listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2019 (as amended).
- 6.8.40 Dolphin species are considered less likely to occur within proximity to the Proposed Development at both the River Tees crossing and Wastewater Corridor Connection due to the levels of industry, marine vessel movement and background noise that is anticipated to occur within a busy harbour area. Busy industrial harbours are less likely to be inhabited by dolphin and whale species due to several environmental factors. The high levels of noise pollution from constant ship traffic and industrial activities can disrupt the communication and navigation of these marine mammals, which rely heavily on sound. Additionally, the water quality in these areas is often compromised due to the discharge of industrial waste and pollutants, making it unsuitable. The physical structures of the harbours, such as piers and docks, also pose a risk of collision for these animals. Lastly, the heavy maritime traffic can lead to an increased risk of fatal ship strikes. Therefore, these conditions make busy industrial harbours inhospitable for dolphins and whales. It is also considered less likely to support dolphin species given the lack of available breeding or foraging grounds for such species.
- 6.8.41 NBN Atlas returned one sighting of bottlenose dolphin (*Tursiops truncatus*), one of Risso's dolphin (*Grampus griseus*) and six of common porpoise (*Phocoena phocoena*) within the Zol. Harbour seal, Risso's dolphin, common porpoise and bottlenose dolphin are listed as priority species on the NERC Act 2006 and are UK BAP priority marine species²⁴⁰. No records were returned from NBN Atlas for within the area of the Wastewater Connection Corridor outfall.

Seals

- 6.8.42 Common and grey seal species are EPS listed under Schedule 4 of the Conservation of Annex II species for which the designation of UK SACs is required since the UK maintains important populations. Additionally, the Conservation of Seals (England) Order 1999 and the Conservation of Seals Act 1970 (as amended) protect seals during the closed season from 1 September to 31 December. Common seals are also a UK BAP Marine Priority species²⁴⁰. Seals are notified features of the Teesmouth and

²⁴⁰ Joint Nature Conservation Committee (2007) UK Biodiversity Action Plan. List of UK BAP Priority Marine Species. Available at: <https://data.jncc.gov.uk/data/98fb6dab-13ae-470d-884b-7816afce42d4/UKBAP-priority-marine-species.pdf> [Accessed 22/01/2025].

Cleveland Coast SSSI and have been recorded locally. As noted in Table E2 of Appendix E (Volume II) the Teesmouth and Cleveland Coast SSSI is designated for the population of breeding common seals present at the mouth of the Tees. It is noted that the population established a regular breeding colony in the 1980s and is the only pupping site in north-east England²³⁷. Harbour seals are known to be present within the estuary and the tidal environment throughout the years. Haul-out sites are located at Greatham Creek and Seal Sands, wherein pupping has been recorded in June and July.

- 6.8.43 NBN Atlas returned 71 sightings of grey seal (*Halichoerus grypus*), 195 sightings of harbour seal within the Zol. None of these records were present within the Zol during the desk study.

Migratory Fish Species

- 6.8.44 Migratory fish species including Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*) and river lamprey (*Lampetra fluviatilis*) may potentially use the River Tees and Greatham Creek to move between spawning grounds and the open sea.
- 6.8.45 Atlantic salmon and sea trout are protected under the Salmon and Freshwater Fishery Act 1975 and the Marine and Coastal Access Act 2009. Both species are also listed in Annexes IIa and Va of the Habitats Directive, Appendix III of the Bern Convention, and as Priority Species in the UK Biodiversity Action Plan. Allis shad is protected under Schedule 5 of the WCA (1981). It is also listed in Annexes IIa and Va of the Habitats Directive, Appendix III of the Bern Convention, and as a Priority Species in the UK Biodiversity Action Plan. River lamprey is protected under the WCA 1981 (as amended). It is also listed on Annex II of the European Commission Habitats Directive. Atlantic salmon are classified as ‘Endangered’ by the International Union for Conservation of Nature (IUCN)²⁴¹ within Great Britain.
- 6.8.46 Atlantic salmon are known to be present within the River Tees and are likely to pass through the study area for the spawning season (October – February) upriver. Whilst no records of Atlantic salmon were present in NBN Atlas, their potential presence cannot be discounted as upriver, the Tees is known to support a population. Data from Department for Environment, Food & Rural Affairs (DEFRA)²⁴² evidence the presence of Atlantic salmon,

²⁴¹ Darwall, W.R.T. & Noble, R.A. (2023) *Salmo salar* (Great Britain subpopulation). The IUCN Red List of Threatened Species 2023. Available at: <https://dx.doi.org/10.2305/IUCN.UK.2023-1.RLTS.T213546282A213546288.en> [Accessed 22/01/2025]

²⁴² Department for Environment, Food and Rural Affairs (2024) Ecology & Fish Bulk Downloads. Freshwater fish counts. Transitional and coastal water (TRaC) NFPD data. Available at: <https://environment.data.gov.uk/ecology/explorer/downloads/> [Accessed 22/01/2025].

sea trout and river lamprey within the past ten years.

- 6.8.47 It is unlikely that the aforementioned migratory species would stay within the proposed River Tees crossing area, beyond migrating upriver, due to the high levels of pollution and lower water quality that is typically present in industrialised harbour areas. The high levels of human activity and noise present can disturb these species and deter them from remaining within the area and are therefore unlikely to stay for extended periods.
- 6.8.48 Environment Agency²⁴³ records on the monthly counts of Atlantic salmon and sea trout at Tees Barrage, located approximately 13 km upstream from the proposed River Tees crossing, have been reviewed. The records for the past ten years show that there was a sudden decline after 2013, with counts generally stabilising from 2014. However, numbers since 2020 have incrementally declined with numbers increasing again in 2024 for Atlantic salmon and sea trout migrating upstream (see Picture 6.1 and Table 6.40 below).

Picture 6.1: River Tees upstream annual fish counts - Tees Barrage

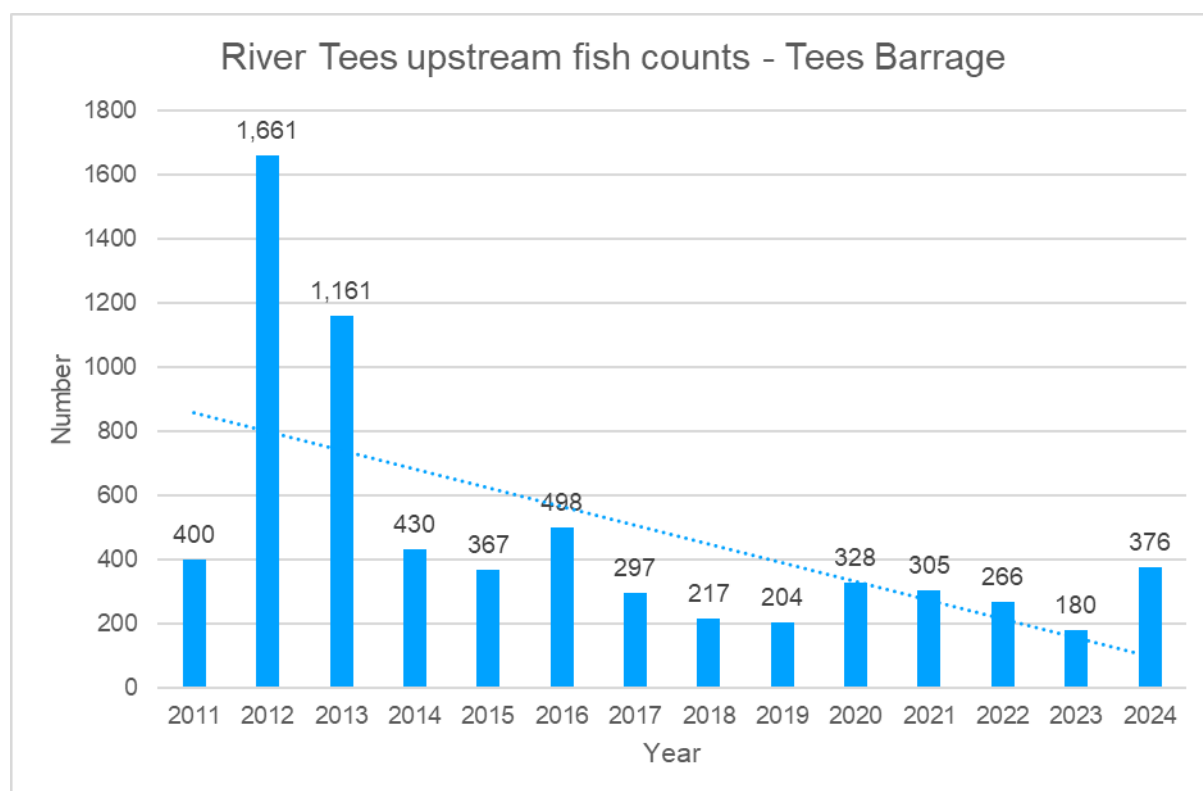


Table 6.40 River Tees upstream monthly fish counts - Tees Barrage

²⁴³ Environment Agency (2024) River Tees Upstream Fish Counts. Statistical data set. Available at: <https://www.gov.uk/government/statistical-data-sets/river-tees-upstream-fish-counts> [Accessed 22/01/2025].

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2011	N/A	N/A	N/A	N/A	N/A	N/A	183	115	49	38	10	5	400
2012	1	0	4	15	22	75	392	735	192	162	48	15	1,661
2013	3	0	0	5	52	105	261	355	186	156	28	10	1,161
2014	1	0	2	7	13	60	111	70	74	42	48	2	430
2015	0	0	2	4	29	24	54	80	102	41	24	7	367
2016	0	1	4	17	33	76	87	225	31	13	6	5	498
2017	0	1	1	7	31	86	95	35	25	10	4	2	297
2018	3	1	0	8	36	51	46	47	11	7	7	0	217
2019	0	4	4	12	15	39	59	26	13	18	14	8	204
2020	2	1	1	10	14	56	74	114	5	18	27	6	328
2021	0	0	5	6	10	31	100	86	19	15	24	9	305
2022	3	2	4	6	21	40	71	53	17	23	24	2	266
2023	0	2	0	16	30	37	17	22	6	23	24	3	180
2024	0	0	3	4	38	55	77	111	45	34	9	N/A	376

Non-Migratory Species

- 6.8.49 The River Tees supports populations of European eel (*Anguilla anguilla*), northern pike (*Esox lucius*) and several commercial fish species including herring (*Clupea harengus*), Atlantic cod (*Gadus morhua*), whiting (*Merlangius merlangus*), plaice and pollack (*Pollachius pollachius*). Greatham Creek also has potential to support populations of these fish species.
- 6.8.50 Based on the brackish nature of the River Tees at the proposed Tees Crossing location, which is approximately 17 m deep and approximately 700 m wide, and that white-clawed crayfish (*Austropotamobius pallipes*) and freshwater pearl mussel (*Margaritifera margaritifera*) prefer fast flowing freshwater upland rivers, the location of the River Tees crossing is not considered suitable for both species. However, the potential for these species to be present within the study area at Greatham Creek cannot be excluded.
- 6.8.51 NBN Atlas returned no records within the proposed River Tees crossing area but had sightings of six fish species which are protected under the NERC Act 2006 within the defined search area; four records of European eel, two records of herring, two records of Atlantic cod, two records of whiting, two records of plaice and one record of sole.
- 6.8.52 The presence of migratory fish species and commercial fish species such as those mentioned above, within a busy industrialised harbour such as the Tees can vary greatly and is dependent upon factors such as water quality,

noise levels and the intensity of human activities. While industrial activity can deter some species, many commercial fish species are quite resilient and can be found in a variety of environments.

- 6.8.53 The Environment Agency's transitional and coastal waters (TraC) monitoring data²⁴⁴ for 2004 - 2024 for the three stations in the mouth of the Tees (noting that there are none on Seal Sands or in Greatham Creek) indicated that sprat *Sprattus sprattus* (8445 records) is most commonly recorded, with lesser sandeel *Ammodytes tobianus* (1468 records) and herring *Clupea harengus* (3292 records) also common. In addition, records of the following species were returned: whiting *Merlangius merlangus* (101 records), sprat, sandeel sp. (146 records), lesser sandeel, cod *Gadus morhua* (171 records), plaice *Pleuronectes platessa* (373 records), hooknose/pogge *Agonus cataphractus* (95 records), herring, dab *Limanda limanda* (90 records), and flounder *Platichthys flesus* (four records).

Intertidal and benthic species

- 6.8.54 A rich diversity of oligochaete worms, polychaete worms, bivalves, in addition to crustaceans and demersal fish species can be located within the intertidal and benthic habitats of the Tees estuary. NBN Atlas had no records of any species within proposed River Tees crossing area or Wastewater Connection Corridor outfall, however, downstream of the Proposed Development Site (approximately 1.5 km) there are records of acorn barnacle (*Semibalanus balanoides*), butterfish (*Pholis gunnellus*), blue mussel (*Mytilus edulis*), common lobster (*Homarus Gammarus*), common periwinkle (*Littorina littorea*), edible crab (*Cancer pagurus*), common starfish (*Asterias rubens*) and thornback ray (*Raja clavata*).
- 6.8.55 Due to the intensity of human activities within the River Tees crossing location and within the ZoI, there is potential that intertidal and benthic habitat condition is affected by water pollution, physical disturbance, and noise. Habitats associated with Teesmouth NNR at Greatham Creek are likely to be less intensively affected by these factors, due to the protections afforded by national designation and sensitive management.

Marine Invasive Non-Native Species

- 6.8.56 Marine INNS within England can pose several risks to the marine environment, resulting in biodiversity loss through competition with native species, habitat alteration, the spread of disease and can result in economic impacts and impacts on human health. Examples of marine INNS include Asian kelp (*Undaria pinnatifida*), Japanese wireweed (*Sargassum*

²⁴⁴ Environment Agency (2024) Environment Agency Ecology & Fish Data Explorer. Available at: <https://environment.data.gov.uk/ecology/explorer/> [Accessed 22/01/2025].

muticum), Asian shore crab (*Hemigrapsus sanguineus*), leathery sea squirt (*Styela clava*).

- 6.8.57 No records of marine INNS were present after a review of NBN Atlas within the proposed River Tees crossing area, Wastewater Connection Corridor outfall, or within the ZOI.

Future Baseline

- 6.8.58 It is difficult to predict the impact that climate change may have on the marine habitats and communities present within the study area due to the large number of influencing factors, including external factors, such as nutrient input, land use change, and management of designated sites within and surrounding the study area, as well as natural variations in communities. This is particularly relevant for benthic communities which are subject to high natural variability, even in the absence of significant external drivers, due to the nature of their lifecycles and distributions.
- 6.8.59 Predicted increases in sea temperature as a result of climate change may affect fish populations within the study area, causing shifts in distribution as habitats become unsuitable, in particular for species such as salmon that are sensitive to temperature for survival and growth²⁴⁵. Increased sea temperatures are likely to result in increased stress, which can result in impacts on growth, reproduction, and survival rates. Other factors have potential to improve populations of migratory fish in the River Tees and Greatham Creek over the lifespan of the Proposed Development, with the biological quality of rivers anticipated to improve because of WFD requirements, which require waterbodies to achieve good ecological status by 2027, as well as nutrient neutrality requirements in place within the Tees catchment area.
- 6.8.60 Given the significant overlap between the Wastewater Connection Corridor outfall and the Tees and Cleveland Coast SPA and Ramsar site, the continued management of these sites will likely have a significant impact on the future baseline of the study area.
- 6.8.61 There is a high level of industrial growth surrounding the River Tees and Greatham Creek, and as such, there is potential for changes to the present baseline of the study area due to changes in land use. Impacts to the present baseline could include loss of habitat for species (including qualifying features of nearby designated sites), impacts on air and water quality, and changes in the distribution of priority habitats. There is also potential for impacts from land-based industrial developments to the marine

²⁴⁵ The Foundation for Conservation of Atlantic Salmon (2024). Available at: <https://www.salmonconservation.ca/salmon-hub/habitat-assessment/> [Accessed 22/01/2025].

environment, particularly during the construction phase, due to potential for runoff, accidental pollution events, and noise and vibration associated with construction works. With development of new industries surrounding the estuary, there is potential for higher levels of activity within the marine environment from vessels.

Potential Impacts

Assumptions, Limitations and Uncertainties

6.8.62 As stated in Section 3, paragraphs 3.2.23 - 3.3.24, use of an existing tunnel is the preferred option for the Proposed Development, although alternatives are being considered concurrently including alternative trenchless crossing methods, or repurposing of an existing pipeline. The following key assumptions have been made regarding the Proposed Development aspects for the River Tees crossing:

- in the event that an existing tunnel crossing is used, dewatering of the tunnel would be required and access points for the dewatering and proposed pipeline installation would be located above ground. These may be around 30 m and 40 m (respectively) from the MHWS mark as denoted in Figure 6.8.1 (Appendix A) within the Proposed Development Site;
- in the event that re-purposing of an existing pipeline is pursued, construction works would be limited to the installation of new piperacks and works compounds onshore;
- in the event that a new HDD or MBT is selected as the crossing method, land either side of the crossing will be required for launch and pipeline stringing including relevant construction activities - landing points on either side of the river would be located above MHWS, within the terrestrial environment/ within existing industrial areas;
- in the event that a new HDD or MBT is selected as the crossing method, no new excavation in the riverbed is required as all drilling would take place within competent strata below the riverbed. A minimum depth of approximately 30 m (at the deepest point of crossing) is envisaged to prevent impacts on river channel integrity;
- for all crossing options under consideration, no in-river construction activities are proposed and as such, no direct impacts to the marine environment are anticipated;
- construction noise is likely to be generated; however, this is not expected to exceed the current background noise levels; and
- no percussive machinery is required to facilitate the Proposed Development within any existing tunnel, if selected.

6.8.63 The following key assumptions have been made regarding the Proposed

Development of the outfall associated with the Wastewater Connection Corridor outfall into Greatham Creek:

- subject to ongoing pipeline constructability assessments and regulatory discussion described in paragraphs 3.2.33 - 3.2.35, any new Wastewater Connection Corridor outfall would be constructed from the shoreline, as far as reasonably practicable;
- the pipeline would extend through the existing rock armour;
- installation of a headwall would require excavation of the existing bank and temporary removal of scour protection to allow placement, compaction and levelling of imported fill prior to the headwall structure being positioned and connection to the outfall pipeline;
- following placement of the headwall, rock armour will be reinstated;
- no dredging within the marine environment is anticipated as being required; and
- in the event that in-river working is required, this will be undertaken from a pontoon or similar and the Proposed Development Site boundary shown in Figure 3.1 (Appendix A) allows for this as a worst-case.

6.8.64 Construction of a new outfall into Greatham Creek therefore has the potential to require relatively minor in-water works, although the need for a new outfall and the nature of any works required in-river is subject to ongoing design.

Construction

6.8.65 The potential impacts identified in relation to the construction works for the River Tees crossing and Wastewater Connection Corridor outfall include:

- potential water pollution impact to the receiving waterbody of the River Tees as a result of an accidental collapse or compromise of integrity of an existing tunnel;
- accidental pollution event from the dewatering and refilling of an existing tunnel; construction activities related to the installation of new pipelines leading to pollution of intertidal and benthic habitats and potential harm to a range of species within those habitats and within the ZoI;
- accidental pollution event from construction activities related to the Wastewater Corridor Connection outfall into Greatham Creek, resulting in potential pollution of intertidal and benthic habitats (including those within Teesmouth NNR) and potential harm to species within those habitats and the ZoI;
- physical disturbance to benthic fauna during installation of the Wastewater Connection Corridor outfall;

- potential sediment runoff during the establishment of temporary construction areas and/ or machinery storage areas impacting the water quality of the River Tees and Greatham Creek;
- loss of foraging resource for birds that feed on benthic fauna during installation of the Wastewater Connection Corridor outfall at Greatham Creek;
- should INNS be present, there would be potential for impacts through spread from the Proposed Development Site during any in-river construction works; and
- disturbance to marine mammals and fish directly during installation works for the outfall at Greatham Creek or indirectly via noise and vibration during works related to the River Tees crossing. The generation of this underwater noise could potentially result in short-term behavioural change or disturbance to marine species, as well as mortality/ injury of fish and is further considered in Appendix H: Underwater Noise and Vibration Technical Appendix (Volume II).

Accidental Spills/ Pollution Event/ Discharge to River Tees and/ or Greatham Creek

- 6.8.66 In the unexpected event of an accidental collapse or compromise to an existing tunnel during the River Tees crossing construction works, there is the potential that water from within the existing tunnel could enter the River Tees. This water would be river water that filled the tunnel naturally following installation of existing pipeline(s), following construction completion and removal of pumps. The Applicant is undertaking testing to determine the status of this water within existing tunnel(s), including any contaminants present and methods for treatment/ discharge of water following dewatering.
- 6.8.67 Dewatering of any tunnel would be scheduled to occur in phases, wherein sections of tunnel are isolated and emptied, thereby reducing the potential for LSE. In the event of a collapse or compromise of the structural integrity of any tunnel, it would be isolated to the surrounding water column in the immediate vicinity. Any contaminated water within the existing tunnel would dissipate to background levels within the River Tees due to the high flow nature of the estuary. The likelihood of an existing tunnel being compromised during internal works is very low. Existing tunnels under consideration have a crown 15 m below the riverbed, at approximately -32 m Ordnance Datum (OD), and therefore it is anticipated any potential effects on the riverbed would not be significant.
- 6.8.68 Potential impacts could also originate from refilling the tunnel with water once the pre-existing pipelines that are not in use are removed and the new Hydrogen Pipeline and Effluent Water Connection installed. Dewatering and refilling would occur at an existing shaft using pumps powered by diesel

generators. The water would be treated on-site, filtered, and then following testing, be returned to the River Tees under an appropriate permit, if the water is found to be of an acceptable quality to be discharged back into the waterbody. Alternatively, water could be contained and transported by water tankers. The likelihood and significance of potentially adverse effects on the water quality within the watercourse would depend on its baseline conditions and the methodology used to extract the water at the dewatering phase. The risk an accidental spill of untreated water during this process and re-entering into the River Tees is very low.

- 6.8.69 In the event that these were to occur, accidental spills from machinery in use during construction/ dewatering has the potential to impact marine biodiversity through pathways such as toxicity and bioaccumulation. An accidental release of hydraulic fluids, oils, fuels etc., into the River Tees has the potential to affect marine organisms. The presence of chemicals present within such materials can result in physiological and biochemical changes to many species, including filter feeding species of bivalves and molluscs. Embedded mitigation such as equipment checks and maintenance, provision of spill kits, bunds and generator drip trays will be outlined in the CEMP in order to reduce the risk of accidental spills as described in paragraph 6.8.105.
- 6.8.70 It is not anticipated that the potential alternative of the HDD or MBT will incur any risk to the marine environment through an accidental pollution or spill event. Standard measures included in design and performance associated with HDD/ MBT would avoid any potential spills or contaminants to enter the marine environment, and embedded mitigation would be included in the CEMP. Should these alternative designs be chosen, they would be informed by appropriate geotechnical investigations along the trenchless crossing alignments, with the design then making reasonable efforts to avoid the risk of an accidental pollution or contaminant spill event.
- 6.8.71 Construction of the Wastewater Connection Corridor outfall into Greatham Creek may involve in-river works in the event shoreline construction is not reasonably practicable. Construction methodology and design of the outfall is subject to ongoing design, however, it is assumed that there is potential for accidental spills originating from land or from minor in-river works, if required.
- 6.8.72 An accidental release of oils, fuels etc., into Greatham Creek has the potential to affect the physiology of invertebrate marine organisms, in particular filter feeders, which can then indirectly, through bioaccumulation, affect species in higher trophic levels, including birds associated with the nearby European designated sites. Embedded mitigation in the form of a CEMP would reduce the risk of accidental spills as described in paragraph

6.8.105.

- 6.8.73 On a precautionary basis, potential impacts in relation to pollution within the marine environment are **Scoped In** for further assessment and mitigation via the CEMP. The CEMP would contain procedures to avoid changes to water quality. A commitment to produce a CEMP would be secured through the draft DCO and a Framework CEMP would be included with the Application including mitigation measures.

Sedimentation

- 6.8.74 There is also the potential that sediment runoff will occur from the establishment of temporary construction areas and/or machinery storage areas, impacting upon the water quality of adjacent water bodies and water courses, such as the River Tees and Greatham Creek. The effects of sedimentation upon the receiving intertidal habitats and/ or species within the River Tees and Greatham Creek could result in habitat degradation through the accumulation of foreign materials to coastal mudflats, changes to water quality and impacts upon filter feeding species such as bivalves and molluscs. It is anticipated that any potential impacts would be localised to the surrounding area of the River Tees crossing tunnel entrance and outfall location into Greatham Creek, and likelihood reduced via the implementation of the CEMP.
- 6.8.75 As significant effects are not considered likely, it is proposed that this topic is **Scoped Out** for further assessment.

Noise and Vibration – River Tees crossing

- 6.8.76 Appendix H: Underwater Noise and Vibration Assessment (Volume II) provides an assessment of the potential for underwater noise and vibration in the study area. Temporary noise and vibration effects are anticipated to occur during the dewatering and pipeline removal/ installation process due to the use of machinery and pumps. Works for the River Tees crossing are expected to be carried over a period of around two years, and as such there is potential for underwater noise disturbance to occur over this period.
- 6.8.77 It is not anticipated that percussive machinery would be used in the River Tees during the proposed River Tees crossing works. With reference to Appendix H, effects of underwater noise and vibration to marine organisms are anticipated to be minor due to the location of existing tunnels >10 m below the riverbed. Noise and vibration effects are limited to fish species which are equipped with a swim bladder e.g., Atlantic salmon and sea trout which pass through the River Tees and the risk is anticipated to be extremely low.
- 6.8.78 Where any noise is contributed to the water, due to the substantial number

of species and contexts, numerical thresholds are not recommended for continuous noise. For fish, a figure of 150 dB sound pressure level root mean square (SPL_{RMS}) is tentatively suggested for the onset of behavioural effects. This continuous type of noise has a low likelihood of disturbance to marine mammals with disturbance thresholds developed for impulsive noise sources. Other adverse effects, such as the masking of other sound (i.e., blocking the audibility of useful sounds in the environment, such as for hunting or communication, by another noise) are possible but also unlikely where the noise source is not present in the water.

- 6.8.79 A figure of 150 dB SPL_{RMS} ²⁴⁶ is higher than any other value measured during the baseline noise study (as outlined in Appendix H) including in the vicinity of boats active in the water, and thus, provided any machinery remains on land, the risk of reaching this level is very low, and would dissipate rapidly. The risk of an effect caused by noise that could be deemed significant is therefore considered unlikely, especially where migratory fish are highly motivated to continue.
- 6.8.80 The construction of the potential alternative (HDD/ MBT) crossings is anticipated to occur a minimum of 30 m depth for the River Tees crossing and as such be below the riverbed depth (17 m). The potential impact in terms of underwater sound and vibration on marine ecological receptors as a result is anticipated to be very low.
- 6.8.81 There are no LSE anticipated as a consequence of underwater noise during construction of the River Tees crossing and this matter is **Scoped Out**.

Noise and Vibration Disturbance – Wastewater Connection Corridor outfall

- 6.8.82 During the construction and installation of the Wastewater Connection Corridor outfall into Greatham Creek, there is likely to be noise, vibration, and lighting impacts, both from works on land near Greatham Creek and potentially, minor in-river works undertaken from a pontoon or similar. As outlined above, impacts are limited to fish species which are equipped with a swim bladder, and marine mammals within Greatham Creek, within Teesmouth NNR. The working methods and design of the outfall are subject to ongoing design (refer to assumptions in paragraph 6.8.63), and therefore it is precautionarily assumed these could include activities that may have the potential to emit vibration.
- 6.8.83 Minor ground works and excavation works may be required during construction of the outfall, including modification of the existing rock armour defences to allow installation of the headwall. Such activities have the

²⁴⁶ Sound Pressure Level measured in Route Mean Square - SPL_{RMS}

potential to result in disturbance to local benthic faunal communities within the sediment around the outfall.

- 6.8.84 Impacts due to increased levels of noise and vibration within Greatham Creek could include the temporary severance of migratory pathways of species including Atlantic salmon and European eel during construction. Movement of these species may be limited as they seek to avoid sources of disturbance, should noise of sufficient decibels propagate across the channel, generating an acoustic barrier to fish species.
- 6.8.85 Injury to fish may arise in cases where construction works emit high levels of vibration, although this is not considered likely. However, mobile species are considered likely to disperse once the works begin, thus avoiding direct mortality of injury from the proposed works. Installation of structures into supporting habitat of fish species has potential to cause injury/ mortality, however it is anticipated that construction will be undertaken during the daytime and at low tide, when the intertidal mud is exposed, and as such it is unlikely that fish will be present.
- 6.8.86 Disturbance associated with construction of the Wastewater Connection Corridor outfall has the potential to displace marine mammals, in particular harbour and grey seals, which are known to haul-out within Greatham Creek. The location of the proposed outfall near to the mouth of the Creek has potential to deter seals from entering the Creek, should the working methods generate sufficient vibration levels to form a barrier across the channel. Construction should be undertaken outside of the seal pupping season (October – December, inclusive) to avoid impacts on seals during this sensitive period.
- 6.8.87 As a result of the potential for noise and vibration disturbance to impact marine ecology receptors at Greatham Creek, this potential impact is **Scoped In** for further assessment. In the event that working methods during design development are able to avoid the need for in-river work, the Applicant would seek to agree with relevant regulators that no LSE are plausible, and no assessment would be presented in the ES.

Physical disturbance of benthic fauna – Wastewater Connection Corridor outfall

- 6.8.88 There is potential for physical disturbance and displacement of benthic fauna during minor groundworks associated with installation of the Wastewater Connection Corridor outfall in the event that in-river working is required. Disturbance of riverbed sediment can result in entrainment of

benthic fauna, with eggs and larvae most at risk of entrainment²⁴⁷. On a precautionary basis, this potential impact is **Scoped In** for further assessment.

Loss of foraging resource for bird species – Wastewater Connection Corridor outfall

- 6.8.89 As outlined above, there is potential for degradation of intertidal and benthic habitats as a result of works to the proposed Wastewater Connection Corridor outfall. Several wading species, including oystercatcher, knot and shelduck, are reliant on benthic fauna for foraging. Species supported by these habitats may include those associated with nearby European designated sites, as well as Teesmouth NNR within which the outfall lies.
- 6.8.90 It is not anticipated that impacts on foraging birds would be significant, given the given the minor scale of the outfall works and relative abundance of alternative suitable foraging habitat within the wider area, including within the remainder of Teesmouth NNR. Upstream within Greatham Creek, there is an abundance of mudflat habitat, which is likely to provide optimal foraging resource for wading bird species. Embedded mitigation in the form of a CEMP (outlined in paragraph 6.8.105) will reduce the likelihood of degrading the habitats within which these bird species forage. This matter is therefore **Scoped Out**.

Spread of Invasive Non-Native Species – Wastewater Connection Corridor outfall

- 6.8.91 No records of INNS were returned by the review of NBN data, however, should any be present within the area of the proposed outfall into Greatham Creek, there is potential for these to be spread through movement of machinery and vehicles, in particular those entering the watercourse during in-river works. It is anticipated that LSE will be avoided through completion of pre-construction INNS surveys, and should INNS be identified during these surveys, provision of an invasive species management plan. In addition, recommended working methods, will be implemented through the CEMP to be produced for the proposed works to avoid spread of INNS from outside of the area.

²⁴⁷ Todd, V.L.G., Todd, I.B., Gardiner, J.C., Morrin, E.C.N., MacPherson, N.A., DiMarzio, N.A., & Thomsen, F. (2015) A review of impacts of marine dredging activities on marine mammals. Available at: https://www.researchgate.net/publication/272166219_A_review_of_impacts_of_marine_dredging_activities_on_marine_mammals [Accessed 22/01/2025].

Operation

River Tees crossing

- 6.8.92 During operation of the Proposed Development, which for each train, may be approximately 25 years as described in Section 3 of this report, there is potential for some operational impacts.
- 6.8.93 No impacts on the marine environment are likely as a result of the distribution of hydrogen via the Hydrogen Pipeline or effluent via the Effluent Water Connection Corridor pipeline within the River Tees crossing, which would be a fully enclosed system that does not interact with the marine environment. Operational impacts are therefore to be **Scoped Out** of the Marine Biodiversity assessment.
- 6.8.94 No impacts to the marine environment are likely as a result of the operation of either alternative proposed (HDD or MBT) given that both entry and exit points exist on the landward sections of the River Tees and the infrastructure would exist below the riverbed. Operational impacts are therefore to be **Scoped Out** of the Marine Biodiversity assessment.
- 6.8.95 Routine planned maintenance works involving testing/ inspection are anticipated to occur during the operational phase of the Hydrogen Pipeline and Effluent Connection Corridor pipeline but are not anticipated to generate any noise or vibration that would exceed background levels or generate any potential water pollution or sedimentation. Routine maintenance impacts are therefore to be **Scoped Out** of the Marine Biodiversity assessment.

Wastewater Connection Corridor outfall

- 6.8.96 Maintenance works at the Wastewater Connection Corridor outfall, which has the potential to include minor clearance works around the outfall, in a worst-case scenario can present some risks for marine ecological receptors. These risks include benthic habitat disturbance, sediment resuspension, contaminant release, noise pollution, alteration of hydrodynamics, and the introduction of INNS. However, these are worst-case scenario assumptions. The extent of any impacts would be limited to the specific (confined) area of the marine environment being worked in. Therefore, any potential impacts would be proportionate to the small area affected.
- 6.8.97 Moreover, if clearance surrounding the outfall for maintenance purposes is required only once a year, the effects would be temporary, localised, and short-term. While there may be some disruption to the marine environment, it would not be continuous and would allow for periods of recovery between clearance activities. Implementing careful planning, monitoring, and mitigation measures including consideration of licensing conditions would minimise any potential for LSE.

- 6.8.98 The permanent discharge associated with the Wastewater Connection Corridor outfall will occur following appropriate treatment to meet legal standards for wastewater discharge as described in paragraph 3.2.25. It is not anticipated that rainfall events or storm events would impact the system as the Proposed Development will incorporate a surface water drainage system in which surface water will be appropriately segregated, treated and attenuated (in a new tank/ pond or similar) prior to discharge to Greatham Creek.
- 6.8.99 There is also potential for accidental release of contaminated or treated water. Impacts of release of contaminated water would likely be similar to those associated with accidental pollutant release during construction, described above. There is no potential for indirect effects on marine benthic habitats and associated species relating to treated water discharge, suspended solids or an accidental pollution event as a result of the embedded design of such outfalls as required by for compliance with WFD. As such, operational impacts of the Wastewater Connection Corridor outfall are to be **Scoped Out** of the marine biodiversity assessment.

Decommissioning

River Tees crossing

- 6.8.100 The impacts and effects of decommissioning of the River Tees crossing within the marine environment are anticipated to be similar to those associated with construction. The ES will provide a description of the activities and works (including the anticipated duration) which are likely to be required during decommissioning and where any LSE have been identified for construction stage activities, the assessment will consider whether similar LSEs could occur during decommissioning.
- 6.8.101 As noted in Appendix H, assuming equipment that may be used is of the same or similar types as those proposed for the construction phase, the risk of any noise transference into the river is unlikely to be significant and any risk during decommissioning is expected to be very low. Underwater noise during decommissioning is therefore **Scoped Out** the marine biodiversity assessment.
- 6.8.102 No in-river works are anticipated during decommissioning of the River Tees crossing and as such, direct loss and physical disturbance to marine habitats and species is **Scoped Out** of the marine biodiversity assessment.
- 6.8.103 Changes to water quality in and around the River Tees crossing that could occur in the intervening period would be addressed via a commitment to a DEMP, which would be secured via the draft DCO. This aspect has therefore been **Scoped Out** of the marine biodiversity assessment.

Wastewater Connection Corridor outfall

- 6.8.104 Using worst-case assumptions, in the event that in-river working is required, the impacts and effects of decommissioning the Wastewater Connection Corridor outfall are anticipated to be similar to those associated with construction. As outlined above, the Marine Biodiversity chapter will consider whether LSE similar to those during construction could occur during decommissioning. As such, decommissioning impacts on the Wastewater Connection Corridor outfall are **Scoped In** to the marine biodiversity assessment. Changes to baseline information that could be happening in the intervening period would be addressed via a commitment to a DEMP, which would be secured via the draft DCO.

Embedded Mitigation

Construction

- 6.8.105 A CEMP will be developed and implemented for the Proposed Development which will reference management sub-plans, procedures and/or method statements with a requirement Engineering, Procurement and Construction (Health, Safety and Environmental) to implement those measures to mitigate/control any other minor or potentially moderate construction impacts i.e. those typical for any construction sites/ activities. The CEMP will include surface water management plans, stormwater/ soil erosion control measures, spill prevention and response plan, waste management plan and site reclamation plan. Measures to protect the marine environment include:
- refuelling of machinery will be undertaken within designated areas where spillages can be easily contained. Machinery will be routinely checked to confirm it is in good working condition;
 - any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment;
 - areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) will be bunded and carefully sited to reduce the risk of hazardous substances entering soils, groundwater, drainage systems or local watercourses that could impact the marine environment;
 - additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into potential receptors following any leakage/spillage;
 - bunds used near the marine environment that will store fuel, oil etc. to have a 110% capacity;

- construction materials will be managed in such a way as to effectively reduce the risk posed to the marine environment; and
- plant machinery and vehicles will be maintained in a good condition to reduce the risk of fuel leaks to the marine environment.

6.8.106 Noise control measures shall be implemented to reduce the potential for impacts upon the receiving environment of the River Tees and Greatham Creek, as set out in Appendix H (Embedded Mitigation). Measures include use of low vibration machinery as far as reasonably practicable during the removal and installation of pipelines within existing tunnels and during the installation of the outfall in the event that in-river works are required at Greatham Creek. Noise or vibration-generating parts of the machinery will not operate in the marine environment.

6.8.107 A Pollution Prevention and Management Plan would be developed in line with the relevant guidance from the Environment Agency Pollution Prevention Guidelines²⁴⁸ and the Construction Industry Research and Information Association (CIRIA) C736 'Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises'²⁴⁹. This will describe a pollution control strategy to be implemented, incorporating measures for protecting ground and surface water during the construction phase. Details on appropriate fuel and chemical storage will be provided, along with measures associated with water abstraction and incident response procedures. Pollution prevention measures will be outlined within the CEMP, including biosecurity precautions and measures to prevent pollutants entering any waterbody. Considering these measures, it is not anticipated that there would be LSE to water quality during construction.

Operation

6.8.108 Impacts upon the marine environment are not anticipated during the operation of the Hydrogen Pipeline and Effluent Connection Corridor pipeline within existing tunnels or alternative HDD/ MBT option.

6.8.109 Discharges to Greatham Creek from the Wastewater Connection Corridor outfall will be controlled via the Environmental Permit.

²⁴⁸ Environment Agency (2016, updated 2024) Pollution prevention for businesses. Available at: <https://www.gov.uk/guidance/pollution-prevention-for-businesses> [Accessed 22/01/2025].

²⁴⁹ CIRIA (2024) Design of containment systems for the prevention of water pollution from industrial incidents (R164). Available at: https://www.ciria.org/CIRIA/Resources/Free_publications/containment_systems.aspx [Accessed 22/01/2024].

Decommissioning

- 6.8.110 During decommissioning, mitigation will include measures within the DEMP relevant for risks to the marine environment.

Summary of Potential Likely Significant Effects

- 6.8.111 At this stage of the assessment potential LSE have been identified for the marine environment. Table 6.41 provides a summary of the marine environment elements that are proposed to be **Scoped In** or **Scoped Out** from the assessment, along with a justification for that decision.

Table 6.41: Marine environment elements Scoped In or Scoped Out of future environmental impact assessment.

Element	Phase	Scoped In	Scoped Out	Justification
Tees River crossing (existing tunnel or MBT/ HDD)				
Injury or disturbance as a result of underwater noise and vibration	Construction		✓	The risk of any underwater noise transference to receptors within the River Tees from works related to the River Tees crossing is not expected. There are no LSE anticipated as a consequence of the Proposed Development and is proposed to be Scoped Out (refer to Appendix H).
Change in water quality / affecting marine habitats and species	Construction	✓		On a precautionary basis, potential impacts in relation to pollution within the marine environment are Scoped In for further assessment and mitigation via the CEMP.
Sedimentation	Construction		✓	Effects likely to be localised, controlled via the CEMP and significant effects are not considered likely. Proposed to be Scoped Out .
Direct loss and physical disturbance to marine habitats and species	Construction		✓	No in-river works are proposed as part of the dewatering or pipeline installation within existing tunnels or alternative MBT/HDD option. Scoped Out .
Injury or disturbance as a result of underwater	Operation		✓	Existing tunnels and/ or HDD/ MBT installed pipelines, once operational, would be a fully enclosed

Element	Phase	Scoped In	Scoped Out	Justification
noise and vibration				system which does not interact with the marine environment. Routine planned maintenance works would not generate noise or vibration that would exceed background levels or generate any potential water pollution or sedimentation. Scoped Out.
Direct loss and physical disturbance to marine habitats and species	Operation		✓	
Change in water quality affecting marine habitats and species	Operation		✓	
Injury or disturbance as a result of underwater noise and vibration	Decommissioning		✓	Assuming equipment that may be used is of the same or similar types as those proposed for the construction phase, the risk of any noise transference into the river is unlikely to be significant and any risk during decommissioning is expected to be very low. Scoped Out (refer to Appendix H).
Direct loss and physical disturbance to marine habitats and species	Decommissioning		✓	No in-river works anticipated for decommissioning stage. Scoped Out.
Change in water quality affecting marine habitats and species	Decommissioning		✓	A DEMP would contain guidance on how changes to water quality can be mitigated. A commitment to produce a DEMP would be secured through the draft DCO. Scoped Out.
Wastewater Connection Corridor outfall				
Injury or disturbance as a result of underwater noise and vibration	Construction Decommissioning	✓		Potential injury and/or disturbance to marine ecology receptors (fish & marine mammals) during construction/ decommissioning of the Wastewater Connection Corridor outfall in the event that any in-river works are required in Greatham Creek Scoped In on a precautionary basis (refer to Appendix H). In the event in-river works are not required,

Element	Phase	Scoped In	Scoped Out	Justification
				engagement with regulators proposed to Scope Out .
Direct loss and physical disturbance to marine habitats and species	Construction Decommissioning	✓		Potential for physical disturbance and displacement of benthic fauna during minor groundworks associated with installation/ decommissioning of the Wastewater Connection Corridor outfall. Scoped In on a precautionary basis.
Loss of foraging resource for bird species	Construction Decommissioning		✓	It is not anticipated that impacts during either construction or decommissioning on foraging birds would be significant, given the minor scale of outfall works and relative abundance of alternative suitable foraging habitat within the wider area, including within the remainder of Teesmouth NNR. Scoped Out .
Change in water quality affecting marine habitats and species	Construction Decommissioning	✓		On a precautionary basis, potential impacts in relation to pollution within the marine environment are Scoped In for further assessment and mitigation via the CEMP/ control via the DEMP.
Sedimentation	Construction Decommissioning		✓	Effects likely to be localised, controlled via the CEMP/ DEMP and significant effects are not considered likely. Proposed to be Scoped Out .
Spread of INNS	Construction Decommissioning		✓	No records of INNS. Effects likely to be controlled via the CEMP/ DEMP and significant effects are not considered likely. Proposed to be Scoped Out .
Injury or disturbance as a result of underwater noise and vibration	Operation		✓	No underwater noise or vibration impacts are anticipated during operation of the Wastewater Connection Corridor outfall – Scoped Out .
Direct loss and physical	Operation		✓	No habitat loss or disturbance to marine

Element	Phase	Scoped In	Scoped Out	Justification
disturbance to marine habitats and species				habitats or species is anticipated during the operation of the Wastewater Connection Corridor outfall – Scoped Out.
Change in water quality affecting marine habitats and species	Operation		✓	The permanent discharge associated with the Wastewater Connection Corridor outfall will meet legal standards for wastewater discharge. Scoped Out.

Proposed Assessment Methodology

Baseline Data Collection

6.8.112 A desk-based study will be conducted to establish the baseline conditions for the Proposed Development. There are several key data sources which will be considered as part of this desk-based study, including:

- EUSeaMap (European Marine Observation Data Network (EMODnet))²⁵⁰ for habitat mapping of the study area;
- BGS Seabed Substrate (Folk 16 classifications) data publicly available on EMODnet;
- European University Information Systems organisation (EUNIS) (European Environment Agency²⁵¹, for classifying benthic habitats;
- Environment Agency for TraC Fish Counts²⁴⁴;
- Spawning and nursery grounds for UK waters as identified by Coull et al.²⁵² and Ellis et al.²⁵³;
- Herring and sandeel suitable sediment classifications as determined by Reach et al.²⁵⁴ and Latto et al.²⁵⁵;

²⁵⁰ EMODnet (2021) EUSeaMap 2021. Available at: <https://emodnet.ec.europa.eu/geoviewer/#!/> [Accessed 22/01/2025].

²⁵¹ European Environment Agency (2012) EUNIS habitat classification. Available at: <https://eunis.eea.europa.eu/index.jsp> [Accessed 22/01/2025].

²⁵² Coull, K.A., Johnstone, R. and Rogers, S.I. (1998) Fisheries Sensitivity Maps in British Waters. Available at: https://www.cefas.co.uk/media/o0fgfobd/sensi_maps.pdf [Accessed 22/01/2025].

²⁵³ Ellis, J.R., Readdy, S.P., Taylor, N. and Brown, M.J. (2012) Spawning and nursery grounds of selected fish species in UK waters. Available at: <https://www.cefas.co.uk/publications/techrep/techrep147.pdf> [Accessed 22/01/2025].

²⁵⁴ Reach I.S., Latto P., Alexander D., Armstrong S., Backstrom J., Beagley E., Murphy K., Piper R. and Seiderer L.J. (2013) Screening Spatial Interactions between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Areas.

²⁵⁵ Latto, P., Reach, S., Alexander, D., Armstrong, S., Backstrom, J., Beagley, E., Seiderer, L. (2013) Screening Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat.

- International Council for the Exploration of the Sea (ICES) International Herring Larvae Surveys (IHLS) (2008 – 2017; 10 years data)²⁵⁶;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas) salmon stocks and fisheries in England and Wales²⁵⁷;
- UK fleet landings 2016-2020 (updated)²⁵⁸;
- Small Cetaceans in the European Atlantic and North Sea data²⁵⁹;
- Inter-Agency Marine Mammal Working Group (IAMMWG) publications²⁶⁰;
- Sea Mammal Research Unit (SMRU) and Special Committee on Seals research reports²⁶¹;
- habitat-based predictions of at-sea distributions for grey and harbour seals in the British Isles²⁶²;
- Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management²⁶³;
- academic papers and online reports as available for the study area; and

²⁵⁶ ICES (2023) Eggs and Larvae – IHLS survey data 2008 – 2017. Available at: <https://www.ices.dk/data/data-portals/Pages/Eggs-and-larvae.aspx> [Accessed 22/01/2025].

²⁵⁷ Centre for Environment, Fisheries and Aquaculture Science and Natural Resources Wales (2021) Salmon stocks and fisheries in England and Wales, 2021. Preliminary assessment prepared for ICES, March 2022. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1093963/SalmonReport-2021-assessment.pdf [Accessed 22/01/2025].

²⁵⁸ Marine Management Organisation (2021) UK sea fisheries annual statistics report 2020 - UK fleet landings by rectangle stock and estimated EEZ 2016-2020. Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2020> [Accessed 22/01/2025].

²⁵⁹ Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. and Øien, N. (2021) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Available at: https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf [Accessed 22/01/2025].

²⁶⁰ Inter-Agency Marine Mammal Working Group (2021) Updated abundance estimates for cetacean Management Units in UK waters. Available at: <https://hub.jncc.gov.uk/assets/3a401204-aa46-43c8-85b8-5ae42cdd7ff3> [Accessed 22/01/2025].

²⁶¹ Special Committee on Seals (SCOS) (2022) Scientific Advice on Matters Related to the Management of Seal Populations: 2022. Available at: <http://www.smru.st-andrews.ac.uk/files/2023/09/SCOS-2022.pdf> [Accessed 22/01/2025].

²⁶² Carter, M.I., Boehme, L., Duck, C.D., Grecian, J., Hastie, G.D., McConnell, B.J., Miller, D.L., Morris, C., Moss, S., Thompson, D. and Thompson, P. (2020) Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Available at: https://assets.publishing.service.gov.uk/media/6022c0bf8fa8f51478436975/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf [Accessed 22/01/2025].

²⁶³ Carter, M.I.D., Boehme, L., Cronin, M.A., Duck, C.D., Grecian, W.J., Hastie, G.D., Jessopp, M., Matthiopoulos, J., McConnell, B.J., Miller, D.L., Morris, C.D., Moss, S.E.W., Thompson, D., Thompson, P.M. and Russell, D.J.F., (2022) Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management. Available at: <https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2022.875869/full> [Accessed 22/01/2025].

- designated sites condition assessments as available.

6.8.113 The requirement and scope for project-specific marine biodiversity surveys, including any intertidal Phase I Walkover surveys to determine the presence of intertidal habitats and species (such as areas of saltmarsh) will be determined as the project progresses, including the design aspects of the Proposed Development that may impact on any relevant marine ecological receptors. As part of this, technical engagement will be undertaken with the MMO (and their advisors, Cefas), Natural England and the Environment Agency, to clarify and agree the need for, scope and design of any surveys. Where required, surveys will follow the JNCC²⁶⁴ monitoring guidance for marine benthic habitats.

Assessment Criteria

6.8.114 The impacts and LSE on marine biodiversity will be undertaken in accordance with CIEEM guidelines⁹¹.

Receptors

6.8.115 The importance criteria for marine biodiversity features are shown in Table 6.42. The importance of an ecological feature is defined with reference to a specific geographical context and the scale of protection, ensuring consistency with CIEEM guidance.

Table 6.42: Importance Criteria for Marine Biodiversity Features

Importance	Description
Very high	Designated sites and qualifying / supporting features of international and national importance. Species which are legally protected and / or in significant decline (i.e., classified as 'endangered' or 'critically endangered' according to the IUCN Red List). High quality examples of rare habitats which are threatened throughout their range
High	Designated sites and qualifying / supporting features of national conservational importance. Priority habitats and species or those considered to be of principal importance for the conservation of biodiversity in England and those species considered vulnerable to decline (i.e. classified as 'vulnerable' or 'near threatened' according to the IUCN Red List). High quality examples of uncommon habitats which are vulnerable throughout their range.
Medium	Habitats and species of regional or local importance (i.e., Annex 1 habitats, in accordance with the Habitats Regulations, which are not a qualifying feature of a nearby designated site). Those species considered to be of 'least concern' (according to the IUCN Red List or the OSPAR) list of threatened and/or declining species for the North-East Atlantic). Poor quality examples of rare or uncommon habitats which are threatened or vulnerable throughout their range.

²⁶⁴ Noble-James, T., Jesus, A. and McBreen, F., (2018) Monitoring guidance for marine benthic habitats (Revised June 2018). Available at: <https://hub.jncc.gov.uk/assets/9ade4be8-63dd-4bbc-afd0-ae71af0849> [Accessed 22/01/2025].

Importance	Description
Low	Habitats and species of low conservation importance, such as those generally abundant and widespread around the UK with no specific local value.

Impacts

- 6.8.116 The potential magnitude of change on marine biodiversity features arising from activities occurring as part of the Proposed Development will be determined in consideration of their beneficial or adverse nature; extent; duration; timing; frequency; and reversibility of the impact.
- 6.8.117 Temporary, permanent, direct and indirect impacts will be considered during the construction, operation and decommissioning phases of the Proposed Development, and any advised mitigation measures will be identified.

Effects

- 6.8.118 To determine the likely significance of effect, the following parameters will be considered:
- impact type – direct or indirect, positive or negative, temporary or permanent;
 - magnitude of impact – the ‘amount’ or intensity of an impact;
 - spatial extent of impact – the area over which the impact will occur; and
 - temporal nature of impact – timing, frequency and duration.
- 6.8.119 The assessment will also give regard to the sensitivity of an ecological feature to an impact which is determined by its:
- adaptability i.e., the capacity, or lack thereof, of a feature to avoid or adapt to a change; and
 - tolerance / resilience i.e., capacity, or lack thereof, of a feature to accommodate temporary or permanent change or recover to pre-existing state following exposure to a change.
- 6.8.120 A description of the significance terminology to be used in the assessment is provided in Table 6.43.

Table 6.43: Description of Significance Terminology.

Classification of effect based on CIEEM guidance	Generic EIA terminology	Description in accordance with CIEEM guidance
Significant (Beneficial)	Major beneficial	Beneficial effect on designated sites, ecosystems, habitat and species at the international level.
	Moderate beneficial	Beneficial effect on designated sites, ecosystems, habitat and species at the national level.

Classification of effect based on CIEEM guidance	Generic EIA terminology	Description in accordance with CIEEM guidance
Non-significant	Minor beneficial	Beneficial effect on designated sites, ecosystems, habitat and species at a local level or regional level.
	Negligible	No effect on designated sites, ecosystems, habitat and species.
	Minor adverse	Adverse effect on designated sites, ecosystems, habitat and species at the local level or regional level.
Significant (Adverse)	Moderate adverse	Adverse effect on designated sites, ecosystems, habitat and species at the national level.
	Major adverse	Adverse effect on designated sites, ecosystems, habitat and species at the international level.

6.9 Material Assets and Waste

Overview

- 6.9.1 This Section sets out the proposed scope and methodology for assessment of effects of the Proposed Development on Material Assets and Waste. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.9.2 This Section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report.

Legislation, Policy and Guidance Context

- 6.9.3 The following legislation, policy and guidance will be considered in the ES:
- Waste Framework Directive (WFD) (2008)²⁶⁵;
 - The European Commission Circular Economy (CE) A new Circular Economy Action Plan for a cleaner and more competitive Europe (2020)²⁶⁶;
 - Environmental Protection Act (1990)¹⁸⁰;

²⁶⁵ The European Commission (2008) Waste Framework Directive (Directive 2008/98/EC).

²⁶⁶ The European Commission (2020) The Circular Economy (CE) A new Circular Economy Action Plan for a cleaner and more competitive Europe 2020.

- The Hazardous Waste (England and Wales) Regulations (as amended) (2005)²⁶⁷;
- The Waste (England and Wales) Regulations (as amended) (2011)²⁶⁸;
- The Waste Electrical and Electronic Equipment (WEEE) Regulations (as amended) (2013)²⁶⁹;
- Environment Act (2021)²¹;
- The Environmental Permitting (England and Wales) Regulations (2016)²³;
- The Overarching NPS for Energy (EN-1) (2024)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF and PPG (2024)^{27,35};
- National Planning Policy for Waste (2014)²⁷⁰;
- The Waste Management Plan for England (2021)²⁷¹;
- Our Waste, Our Resource: a strategy for England (2018)²⁷²;
- A Green Future: Our 25 year plan to improve the Environment (2018)⁸⁸;
- Outcome Indicator Framework for the 25 Year Environment Plan (2023)²⁷³;

²⁶⁷ UK Government (2016) The Hazardous Waste (England and Wales) Regulations (Amended) 2016.

²⁶⁸ UK Government (2014) The Waste (England and Wales) Regulations (Amended) 2014.

²⁶⁹ UK Government (2013) The Waste Electrical and Electronic Equipment (WEEE) Regulations (as amended).

²⁷⁰ Ministry of Housing, Communities & Local Government (2021) National Planning Policy for Waste 2014. Available at: <https://www.gov.uk/government/publications/national-planning-policy-for-waste> [Accessed 29/11/2024].

²⁷¹ Department for Environment, Food and Rural Affairs (2021) Waste Management Plan for England. Available at: <https://www.gov.uk/government/publications/waste-management-plan-for-england-2021> [Accessed 29/11/2024].

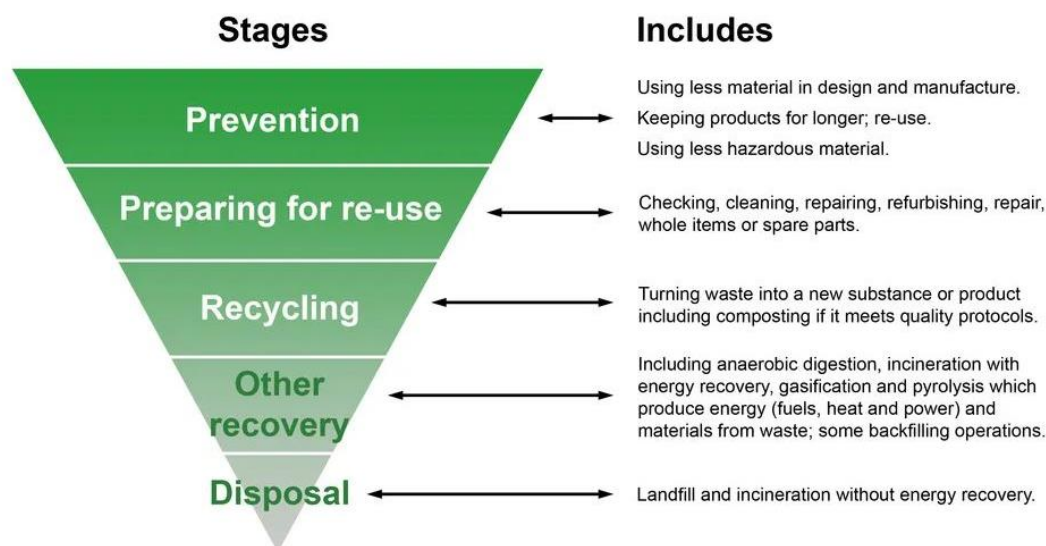
²⁷² UK Government (2018) Our Waste, Our Resources: a strategy for England. Available at: <https://assets.publishing.service.gov.uk/media/5c18f11740f0b60bbee0d827/resources-waste-strategy-dec-2018.pdf> [Accessed 29/11/2024].

²⁷³ Department for Environment, Food and Rural Affairs (2023) Outcome Indicator Framework for the 25 Year Environment Plan. Available at: <https://oifdata.defra.gov.uk/> [Accessed 29/11/2024].

- The Tees Valley Joint Minerals and Waste Plan Core Strategy development plan documents (DPD) (2011)²⁷⁴;
- Local aggregate assessment (LAA) (2017)²⁷⁵; and
- RCBC Local Plan (2018)³¹.

6.9.4 The WFD as incorporated into UK Law requires the UK to take account of the Waste Hierarchy (see Picture 6.2) including appropriate measures to encourage firstly the prevention of waste production, and secondly the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials, or the use of waste as a source of energy. The requirements of the WFD include a target for the construction industry to re-use, recycle and recover 70% of construction and demolition waste.

Picture 6.2: The Waste Hierarchy



Consultation

6.9.5 Following receipt of the EIA Scoping Opinion, additional technical engagement will be undertaken with relevant consultees including SBC and the TVCA Mineral and Waste departments to address any comments raised in the EIA Scoping Opinion, and where relevant to: clarify the baseline information, assessment methodology, any potential mitigation measures

²⁷⁴ Boroughs of Darlington, Hartlepool, Middlesbrough, Redcar and Cleveland and Stockton-on-Tees (2011) The Tees Valley Joint Minerals and Waste Core Strategy DPD. Available at: <https://www.middlesbrough.gov.uk/planning-and-development/planning-policy/tees-valley-joint-minerals-and-waste-dpds/> [Accessed 29/11/2024].

²⁷⁵ Darlington Borough Council, Hartlepool Borough Council, Middlesbrough Council, Redcar and Cleveland Borough Council and Stockton-on-Tees Borough Council (2017) Tees Valley Joint Local Aggregates Assessment. Available at: <https://www.middlesbrough.gov.uk/planning-and-development/planning-policy/tees-valley-joint-local-aggregate-assessment-laa/> [Accessed 29/11/2024].

outlined and the availability of data regarding Mineral Safeguarding Areas (MSA), material supplies, and waste infrastructure within the expansive study area²⁷⁶.

Baseline Conditions and Receptors

Study area

- 6.9.6 Appropriate study areas have been established for the Material Assets and Waste assessment as outlined in the IEMA Guidance on Materials and Waste in EIA (in this Section, referred to as ‘the IEMA Guidance’)²⁷⁷. The ‘development study area’ consists of the Proposed Development Site boundary including the Indicative Construction Laydown Areas (Figure 3.2 - Appendix A). The ‘expansive study area’ consists of the geographical area of the North-East of England. It includes the availability of materials as well as the capacity of waste management infrastructure (landfill). The expansive study is expanded to include national materials stocks where relevant. In addition, the expansive study area for hazardous waste landfill capacity is within England. As indicated within the IEMA Guidance, professional judgement is used to provide consideration on a balance of the proximity principle and value for money principle for establishing the expansive study area.

Existing Baseline

Materials

- 6.9.7 Materials used during construction will include primary raw materials, such as aggregates and minerals, and manufactured construction products which include recycled and secondary aggregates. The term ‘aggregate’ is an umbrella descriptor for bulk raw materials used in large development and infrastructure construction schemes.
- 6.9.8 Metals, aggregate, pavement, concrete and soils required for construction of a typical project will often originate off-site, purchased as construction products, whilst some would arise on-site such as excavated soils.
- 6.9.9 Baseline information on national and global availability for material resources has been collected for the key raw materials likely to be used in

²⁷⁶ The ‘expansive study area’ will consist of the geographical area of the North-East of England. It will include the availability of materials as well as the capacity of waste management infrastructure (landfill). The expansive study area can be expanded to include national materials stocks where necessary. In addition, the expansive study area for hazardous waste landfill capacity is within England.

²⁷⁷ Institute of Environmental Management and Assessment (2020) Materials and Waste in Environmental Impact Assessment. Available at: <https://www.iema.net/content/materials-and-waste-in-environmental-impact-assessment-march-2020/> [Accessed 29/11/2024].

the Proposed Development and are shown in Table 6.44.

Table 6.44: Mineral Availability

Material	Material availability (tonnes per annum)
Sand and Gravel (UK) 2022 ²⁷⁸	53,000,000
Crushed Rock (UK) 2021 ²⁷⁹	148,000,000
Asphalt 2021 (UK) ²⁸⁰	28,000,000
Cement 2021 (UK) ²⁸⁰	11,000,000
Refined Copper (global)2021 ²⁷⁹	24,800
Crude Steel (global) 2021 ²⁷⁹	1,915,000,000

- 6.9.10 The Tees Valley Joint Minerals and Waste Core Strategy DPD (in this Section referred to as ‘the DPD’) identifies that the sterilisation of minerals occurs when non-minerals developments take place either on, or near to, mineral deposits and make them unable to be extracted. Sand and gravel, limestone, potash, salt, gypsum/ anhydrite, and coal are widespread across the Tees Valley. There is sand and gravel extraction at Stockton Quarry near Thorpe Thewles and Hart Quarry (Hartlepool). No direct impacts on these quarries are anticipated from the Proposed Development given their location approximately 10 km to the west and 10.4 km to the north of the HPF Area respectively.
- 6.9.11 Marine dredged sands and gravels are known to be within two mineral safeguard wharves on the River Tees:
- Tees Dock (RCBC) to the immediate south of/ which intersects the Hydrogen Pipeline (east) in the vicinity of the River Tees crossing; and
 - Billingham Reach Industrial Estate (SBC) 1.5 km south of the Hydrogen Pipeline (west).
- 6.9.12 The DPD also identifies that there is one brinefield currently active near Seal Sands, Stockton-on-Tees. Two further brinefields in the Seal Sands area have extant planning permissions and two brinefield cavities at Wilton (RCBC) have extant permission for extraction under an ‘Instrument of Consent’.

²⁷⁸ Department for Business and Trade (2024) Monthly Statistics of Building Materials and Components.

²⁷⁹ British Geological Society (2024) World Mineral Production 2017 -2021.

²⁸⁰ Minerals Product Association (2024) Mineral Products Essential for the Economy and Our Way of Life. Available at: https://www.mineralproducts.org/MPA/media/root/Publications/2023/Profile_of_the_UK_Mineral_Products_Industry_2023.pdf [Accessed 22/01/2025].

- 6.9.13 The BGS²⁸¹ data identifies there are MSA within the development study area for:
- gypsum;
 - salt; and
 - superficial sand and gravel (located close to the development study area).
- 6.9.14 There are a range of material assets in the north of England and the TVCA area. An LAA²⁷⁵ has been prepared jointly by the five Tees Valley authorities of Darlington Borough Council, HBC, Middlesbrough Council, RCBC and SBC. The LAA provides an assessment of the demand for and supply of aggregates in the joint Tees Valley local authority areas, other relevant local information, and an assessment of all supply options.
- 6.9.15 The assessment identifies the joint Tees Valley local authority areas had permitted reserves of 1.3 million tonnes of sand and gravel in 2014 and 1.9 million tonnes of crushed rock in 2016. The LAA identifies that Stockton Quarry had ceased operating however, noted that there are still extractable resources and there are gypsum resources around the area.
- 6.9.16 The sensitivity of off-site raw material resources in the expansive study area are considered to be low, due to the existing trend in available materials.
- 6.9.17 There are also a range of material assets across the North-East of England. A LAA has been prepared jointly that provides an assessment of the demand for and supply of aggregates in the North-East. The assessment identifies the North-East of England has permitted reserves of 173 million tonnes of crushed rock in 2022 and of 13 million tonnes of sand and gravel in 2022.

Waste

- 6.9.18 The latest available information from the Environment Agency²⁸² has been used to inform the baseline with respect to waste infrastructure capacity in the North-East former planning regions.
- 6.9.19 The Environment Agency provides landfill capacity data in volume (cubic metres), and this has therefore been converted to mass (tonnes) using the following industry recognised conversion factors²⁸³:
- 1.5 tonnes per cubic metre for hazardous waste landfill;

²⁸¹ British Geological Survey (2023) GeoIndex Onshore. Available at: <https://www.bgs.ac.uk/map-viewers/geoindex-onshore/> [Accessed 29/11/2024].

²⁸² Environment Agency (2024) Waste Management Information 2023 Former North East Region.

²⁸³ High Speed Rail (2015) High Speed Rail London to West Midlands Environmental Statement. Available at: <https://www.gov.uk/government/collections/hs2-phase-one-environmental-statement-documents> [Accessed 29/11/2024].

- 0.83 tonnes per cubic metre for non-hazardous waste landfill; and
- 1.5 tonnes per cubic metre for inert waste landfill.

6.9.20 **Table 6.45** provides a summary of the transfer, treatment and metal recycling capacity in the North-East region in 2023.

Table 6.45: Transfer, treatment and metal recycling site input in the North-East in 2023

Facility type	County Durham (tonnes)	Northumberland (tonnes)	Tees Valley Unitary (tonnes)	Tyne and Wear (tonnes)	North-East Capacity (tonnes)
Waste transfer	455,000	383,000	671,000	1,137,000	2,647,000
Waste treatment	463,000	419,000	2,318,000	722,000	3,922,000
Metal recycling	257,000	2,300	202,000	434,000	895,000

6.9.21 The waste incineration capacity for the North-East region in 2023 is displayed in Table 6.46.

Table 6.46: Waste incineration capacity in the North-East in 2023

Facility type	County Durham (tonnes)	Northumberland (tonnes)	Tees Valley Unitary (tonnes)	Tyne and Wear (tonnes)	North-East Capacity (tonnes)
Hazardous Waste	0	0	7,400	0	7,400
Co-Incineration of Non-Hazardous Waste	0	0	0	0	0
Municipal and/or Industrial & Commercial	0	0	1,128,000	0	1,128,000
Biomass / Waste Wood	113,000	0	35,000	0	148,000

6.9.22 Table 6.47 below provides a summary of the landfill capacity within the North-East region in 2023 for the disposal of construction and operation waste arising from the Proposed Development.

Table 6.47: Landfill capacity the North-East in 2023

Facility type	County Durham (tonnes)	Northumberland (tonnes)	Tees Valley Unitary (tonnes)	Tyne and Wear (tonnes)	North-East Capacity (tonnes)
Inert waste landfill	9,589,000	0	0	293,000	9,882,000
Non-hazardous waste landfill	2,192,000	472,000	4,715,000	0	7,380,000
Hazardous waste landfill	0	0	5,687,000	0	5,687,000

6.9.23 The DPD identifies the following wastes sites to be safeguarded:

- Policy MWP4 Graythorp Industrial Estate (Hartlepool);
- Policy MWP5 Haverton Hill, Haverton Road, Stockton-on-Tees;
- Policy MWP6 New Road, Billingham, Stockton-on-Tees;
- Policy MWP7 Port Clarence Stockton-on-Tees;
- Policy MWP8 South Tees Eco-Park, Redcar;
- Policy MWP9 Area of Search for Stockton South Household Waste Recycling Centre, Stockton-on-Tees; and
- Policy MWP10 Other potential Construction and Demolition Waste Recycling sites.

Future baseline

6.9.24 The latest available information on materials and waste infrastructure capacity has been used to inform the future baseline. Where information on likely trends is available, this is utilised to define the potential future baseline. It is anticipated that different types of waste infrastructure capacity will continue to be available during the construction, operation and decommissioning of the Proposed Development. Landfill will experience some use of available capacity as void space is taken. Government policy measures are also likely to continue to divert waste from landfill.

6.9.25 Permitted capacity data published by the Environment Agency for 2023 has been used to estimate the projected landfill capacity for the North-East region for the future baseline to 2028. The average percentage change has then been applied to the 2018 permitted landfill capacity and projected forward to 2028. This method assumes that the average percentage change in permitted capacity for each class of landfill remains constant. The use of an average value taken from historical data provides an allowance for

potential future increases or decreases in permitted capacity for each class of landfill.

- 6.9.26 The data identifies the future inert, non-hazardous and hazardous landfill capacity in the North-East for the disposal of construction, operation and decommissioning waste arising from the Proposed Development.

Table 6.48: Future Landfill Capacity in the North-East region

Facility type	Estimated Capacity (tonnes)				
	2024	2025	2026	2027	2028
Inert waste landfill	9,974,000	9,238,000	8,556,000	7,924,000	7,339,000
Non-hazardous landfill	7,497,000	7,386,000	7,277,000	7,169,000	7,063,000

- 6.9.27 Table 6.49 identifies the future hazardous landfill capacity in England for the disposal of construction, operation and decommissioning waste arising from the Proposed Development.

Table 6.49: Future Hazardous Landfill Capacity in England

Facility type	Estimated Capacity (tonnes)				
	2024	2025	2026	2027	2028
Hazardous landfill	12,817,000	10,556,000	8,694,000	7,161,000	5,898,000

Potential Impacts

Construction

Materials

- 6.9.28 With respect to materials, impacts relate to the extraction of primary raw materials and the production of construction materials. In addition, the Proposed Development has the potential to constrain existing or future use and extraction of materials. According to IEMA Guidance²⁷⁷, by consuming materials, developments potentially impact upon their immediate, and for primary materials, their long-term availability resulting in the depletion of natural resources with consequential adverse impacts for the environment.

Waste

- 6.9.29 In terms of waste, the potential environmental impacts are primarily related to the production, movement, transport, processing, use and disposal of waste from the Proposed Development. The Proposed Development has the potential to generate construction waste which could potentially affect the capacity of waste management infrastructure in the North-East region.

Potential impacts include temporary use of waste management facilities' capacity (during treatment) and a permanent decrease in landfill capacity (disposal). As landfill is a finite resource, disposal of waste by landfill creates pressure on existing facilities or requires new sites to be developed. Similarly, waste management and treatment facilities have limits on processing capacity which can be affected if used by the Proposed Development.

- 6.9.30 The existing CATS Terminal infrastructure that are no longer in use and would be demolished to facilitate the Proposed Development will generate demolition waste. This will include the demolition of minor parts of the existing CATS Terminal including the Reception, Flare Vent Reed Bed and other remaining infrastructure such as cables and pipes.
- 6.9.31 Modular plant is proposed for the Proposed Development, as far as reasonably practicable, to minimise on-site fabrication.

Operation

Materials

- 6.9.32 With respect to materials, impacts relate to the extraction of primary raw materials and the production of materials to be used in operation.

Waste

- 6.9.33 In terms of waste, the potential environmental impacts are primarily related to the production, movement, transport, processing, use and disposal of waste from the Proposed Development. The Proposed Development has the potential to generate operational non-hazardous waste which could potentially affect the capacity of waste management infrastructure in the North-East region, and for hazardous waste, the capacity of infrastructure in England.

Decommissioning

Materials and waste

- 6.9.34 Modular plant is proposed as far as reasonably practicable to minimise on-site fabrication. Modular construction techniques²⁸⁴ will assist in minimising waste during the decommissioning stage as this more readily allows disassembly, with subsequent opportunities for re-use and recycling.

²⁸⁴ A construction technique whereby materials are pre-assembled off-site and delivered to site as pre-assembled units, rather than individual equipment items.

Summary

- 6.9.35 The Proposed Development will result in additional resource consumption and waste generation during the construction, operational and decommissioning phases which will impact on waste management infrastructure capacity. Therefore, an assessment of the impacts of the Proposed Development on material stocks and waste management infrastructure will be **Scoped In** to the ES.

Embedded Mitigation

- 6.9.36 Considering materials at the earliest opportunity in the design process is likely to provide the greatest opportunities for resource efficiency. Similarly, contractors will be encouraged to consider the sustainability of construction materials (e.g. materials with a high recycled content) which help to support the principles of a Circular Economy.
- 6.9.37 A Waste Management & Monitoring Plan for the Proposed Development was developed during the Phase 1 Front End Engineering Design (FEED) process which describes anticipated waste sources and estimated quantities for different project elements of Phase 1, e.g. construction, operations, decommissioning. This will be reviewed for Phase 2 as the design develops.
- 6.9.38 In addition, a Construction Execution Plan developed during Phase 1 FEED outlines a range of sustainable construction techniques that the appointed contractor would be encouraged to explore during subsequent detailed design stages, e.g. use of sustainable concrete.

Construction

- 6.9.39 Site levels and grading of the Proposed Development will be designed to achieve a cut and fill balance as far as reasonably practicable to minimise excavation quantities and thereby the requirement for bulk material import. The Outline LBMEP that accompanies the Application will incorporate flexibility in the landscaping elements, where practicable, so that arisings can be re-used.
- 6.9.40 The Proposed Development will take into consideration the waste hierarchy (see Picture 6.2), with a view to minimising the overall volume of waste arisings via designing out waste and maximising efficient use of materials, ultimately to prevent and minimise waste sent to landfill.
- 6.9.41 A SWMP within the Final CEMP will set out the requirement for the completion of a construction stage SWMP and present the approach that would be adopted during the construction phase to manage wastes in accordance with the waste hierarchy.

- 6.9.42 In practice, it is expected that the majority of construction and demolition wastes from the Proposed Development would be recycled or otherwise recovered. Government statistics ²⁸⁵ report that the recovery rate for construction and demolition waste in England was 93.3% in 2020 (the most recent year for which there is published data).
- 6.9.43 The SWMP will specify waste streams to be monitored and set goals with respect to waste produced and recycled. The Applicant will require that the contractor segregates waste streams prior to them being taken for recycling or disposal and wastes will be removed from the Proposed Development Site by fully licenced waste carriers and taken to permitted waste sites.
- 6.9.44 The SWMP, secured via the Final CEMP, will also incorporate measures that include specifying that contractors:
- consider procuring materials with recycled content, as far as reasonably practicable; and
 - consider local sources for aggregate supplies preferentially, whenever possible.

Operation

- 6.9.45 The HPF and generating station will require an Environmental Permit to operate and therefore activities, including processes that give rise to waste products, will be designed in accordance with BAT and comply with the Environmental Permitting (England and Wales) Regulations 2016. BAT for the Proposed Development is set out in Environment Agency guidance¹⁷ which advises that solid and liquid wastes are minimised and treated, where appropriate.
- 6.9.46 As set out in Section 3.7, the Proposed Development will be operated in line with appropriate standards and the operator will implement and maintain an EMS certified to ISO 14001 which sets out the requirements and procedures for waste management and other environmental aspects that require control.

Decommissioning

- 6.9.47 During decommissioning, the Proposed Development will follow the principles of the waste hierarchy. Due to the design life of the Proposed Development (circa 25 years), and the potential for operation to continue after this design life (dependent on market factors), it is not possible to reliably forecast decommissioning requirements and infrastructure. As

²⁸⁵ Department for Environment, Food & Rural Affairs (2024) UK Statistics on Waste. Available at: <https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste> [Accessed 22/01/2025].

stated in Section 3.8, a DEMP will be developed and agreed with the Environment Agency as part of the Environmental Permitting and site surrender process upon reaching the end of its operational life and contain guidance on how risks can be removed or mitigated to avoid potential adverse impacts in accordance with the waste hierarchy and environmental legislation prevalent at that time. On this basis, no residual significant effects in relation to material assets and waste would be anticipated during decommissioning with the implementation of the DEMP (secured by requirement of the draft DCO) and therefore decommissioning has been **Scoped Out** of the ES.

Summary of Potential Likely Significant Effects

6.9.48 At this stage of the assessment, potential significant effects have been identified for materials and waste following the IEMA Guidance. Table 6.50 provides a summary of the materials and waste elements that are proposed to be **Scoped In** or **Scoped Out** from the assessment, along with a justification for that decision.

Table 6.50: Materials and Waste elements Scoped In or Out of environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility				
Materials	Construction	✓		Additional materials consumed during construction.
Waste	Construction	✓		Additional waste generated during construction.
Materials	Operation	✓		Additional materials consumed during operation.
Waste	Operation	✓		Additional waste generated during operation.
Materials	Decommissioning		✓	A DEMP would contain guidance on how materials and waste impacts and effects can be removed or mitigated. A commitment to produce a DEMP would be secured through the draft DCO.
Waste	Decommissioning		✓	
Hydrogen Pipeline				
Materials	Construction	✓		Additional materials consumed during construction.
Waste	Construction	✓		Additional waste generated during construction.

Element	Phase	Scoped In	Scoped Out	Justification
Materials	Operation		✓	Additional materials would not be consumed during operation.
Waste	Operation		✓	Additional waste would not be generated during operation.
Materials	Decommissioning		✓	A DEMP would contain guidance on how materials and waste impacts and effects can be removed or mitigated. A commitment to produce a DEMP would be secured through the draft DCO.
Waste	Decommissioning		✓	

Proposed Assessment Methodology

Baseline Data Collection

- 6.9.49 Baseline data will be sourced from publicly available sources and via additional technical engagement, where relevant with consultees.

Assessment Criteria

- 6.9.50 An assessment of the LSE for material assets and waste, including the identification of receptors, will be undertaken using the IEMA Guidance.

Receptors

- 6.9.51 The sensitivity of receptors (i.e., material demand for construction) depends on the availability in the UK and type of resources to be consumed during construction and operation of the Proposed Development. As the exact source of the construction materials for the Proposed Development is not yet known, the analysis of sustainable features and benefits compared to industry-standard materials will be excluded from the assessment. The criteria described within Table 6.51 will be used to evaluate the sensitivity of materials.

Table 6.51: Material receptor sensitivity (as set out in the IEMA Guidance)

Effects	Negligible	Low	Medium	High	Very High
On balance, the key materials required for the construction of a development.	Are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock; and/or are available comprising a very high proportion of sustainable features and benefits compared to industry standard materials.	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.	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.	Are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock; and/or comprise little or no sustainable features and benefits compared to industry-standard materials.	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.

- 6.9.52 The environmental effects, including their associated significance, will be assessed as a function of the sensitivity of the identified receptors (inert, non-hazardous, and hazardous landfill capacity), and the magnitude of impact on those receptors. The sensitivity for materials receptors on the Proposed Development for operation will be identified in the EIA.
- 6.9.53 The sensitivity of waste receptors relates to the availability of regional (and where appropriate, national) landfill void capacity. This is assessed by virtue of the rate at which the available capacity is anticipated to change in the absence of the Proposed Development. The sensitivity thresholds are identified in **Table 6.52**.

Table 6.52: Thresholds for considering the sensitivity of landfill capacity (as set out in the IEMA guidance)

Waste receptor	Sensitivity				
	Negligible	Low	Medium	High	Very High
Inert and non-hazardous landfill capacity	Remain unchanged or is expected to increase through a committed change in capacity.	Reduce minimally: by < 1% as a result of wastes forecast.	Reduce noticeably: by 1–5% as a result of wastes forecast.	Reduce considerably: by 6–10% as a result of wastes forecast.	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.
Hazardous landfill capacity	Remain unchanged or is expected to increase through a committed change in capacity.	Reduce minimally: by < 0.1% as a result of wastes forecast.	Reduce noticeably: by 0.1–0.5% as a result of wastes forecast.	Reduce considerably: by 0.5–1% as a result of wastes forecast.	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.

6.9.54 The sensitivity of landfill capacity will be evaluated through the sourcing and use of data relating to the inert, non-hazardous and hazardous landfill void capacity data in the North-East region, and across England.

Impacts

6.9.55 The magnitude of impacts from materials will be assessed by using a percentage-based approach that evaluates the influence of materials consumption on the baseline market capacity (production, stocks, or sales), in construction and/ or operation, in combination with the potential to sterilise (substantially) one or more allocated mineral site. The magnitude thresholds to be used are shown in Table 6.53.

Table 6.53: Thresholds for considering the magnitude of impacts from materials (as set out in the IEMA Guidance)

No change	Negligible	Minor	Moderate	Major
No materials are required.	No individual material type is equal to or greater than 1% by volume of the regional (or where justified national) baseline availability.	One or more materials are between 1-5% by volume of the regional (or where justified national) baseline availability; and/or the development has the potential to adversely and substantially ²⁸⁶ impact access to one or more allocated mineral site (in their entirety), placing their future use at risk.	One or more materials are between 6-10% by volume of the regional (or where justified national) baseline availability; and/or one allocated mineral site is sterilised by the development rendering it inaccessible for future use.	One or more materials are >10% by volume of the regional (or where justified national) baseline availability; and/or more than one allocated mineral site is substantially sterilised by the development rendering it inaccessible for future use.

6.9.56 The magnitude of impacts from waste will be assessed by determining the percentage of the remaining landfill void capacity that will be depleted by waste produced during the construction and/ or operation phases of the development. The magnitude thresholds to be used are shown in Table 6.54.

Table 6.54: Thresholds for considering the magnitude of impacts from waste (as set out in the IEMA Guidance)

Waste Receptor	Magnitude				
	No change	Negligible	Minor	Moderate	Major
Inert and non-hazardous landfill	Zero waste generation and disposal from the Project.	Waste generated by the Project will reduce regional landfill void capacity baseline by < 1%.	Waste generated by the Project will reduce regional landfill void capacity baseline by 1 to 5%.	Waste generated by the Project will reduce regional landfill void capacity baseline by 6 to 10%.	Waste generated by the Project will reduce regional landfill void capacity baseline by > 10%.

²⁸⁶ Justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed.

Waste Receptor	Magnitude				
	No change	Negligible	Minor	Moderate	Major
Hazardous landfill	Zero waste generation and disposal from the Project.	Waste generated by the Project will reduce national landfill void capacity baseline by < 0.1%.	Waste generated by the Project will reduce national landfill void capacity baseline by < 0.1 to 0.5%.	Waste generated by the Project will reduce national landfill void capacity baseline by < 0.5 to 1%.	Waste generated by the Project will reduce national landfill void capacity baseline by > 1%.

Effects

6.9.57 The significance of environmental effects associated with material assets and waste will be evaluated by considering the scale and nature of impacts within the context of the sensitivity of receptors affected. The IEMA Guidance provides a table for assessing the magnitude of impact for materials and waste as displayed in Table 6.55. Where there are two potential values for significance (i.e. slight or moderate) the EIA will identify the value which reports the reasonable worst-case (i.e. if it is as adverse effect it will be the higher value and if it is beneficial it will be the lower value). Any effect identified to be moderate or greater will be considered to comprise a likely significant environmental effect.

Table 6.55: Significance matrix (as set out in the IEMA Guidance)

	Magnitude of impact					
	No change		Negligible	Minor	Moderate	Major
Sensitivity (or value) of receptor	Very high	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
	High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/ Very Large
	Medium	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
	Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate
	Negligible	Neutral	Neutral	Neutral/ Slight	Neutral/ Slight	Slight

6.9.58 The IEMA Guidance provides a table for assessing the magnitude of impact for the diversion of waste as displayed in Table 6.56.

Table 6.56: IEMA Magnitude Landfill Diversion (as set out in the IEMA guidance)

No Change	Negligible	Minor	Moderate	Major
100% landfill diversion	90-99% landfill diversion	60-89% landfill diversion	30-59% landfill diversion	<30% landfill diversion

Assumptions, Limitations and Uncertainties

- 6.9.59 The material and waste assessment will be based on the latest information available at the time of writing the ES.
- 6.9.60 The assessment within the ES will be in-line with the latest available design information at the time of submission. Where design information is unknown or unavailable, worst-case assumptions will be made in accordance with Rochdale Envelope principles. It is anticipated that material and waste types and quantities will remain indicative and subject to change as the design develops.

	Magnitude of impact					
	No change		Negligible	Minor	Moderate	Major
Sensitivity (or value) of receptor	Very high	Neutral	Slight	Moderate/ Large	Large/ Very Large	Very Large
	High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/ Very Large
	Medium	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
	Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate
	Negligible	Neutral	Neutral	Neutral/ Slight	Neutral/ Slight	Slight

6.10 Major Accidents and Disasters

Overview

- 6.10.1 This Section sets out the proposed scope and methodology for assessment of the vulnerability of the Proposed Development to major accidents and disasters (MA&D) during its construction, operation and maintenance, and decommissioning, caused by natural hazards or manmade hazards and any likely significant environmental effects. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.10.2 This section should be read in conjunction with the description of the

Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report and is supported by the following appendices (Volume II):

- Appendix J: Major Accidents and Disasters – Initial Long List of Risk Events.

6.10.3 Appendix J also contains baseline data on COMAH sites that informs this Section.

Legislation, Policy, and Guidance Context

6.10.4 The following legislation, policy and guidance will be considered in the ES:

- The Infrastructure Planning (Environmental Impact Assessment) Regulations (2017)¹;
- COMAH Regulations (2015)²⁸⁷;
- The Pipeline Safety Regulations (PSR) (1996)²⁸⁸;
- The Planning (Hazardous Substances) Regulations (2015)²⁸⁹;
- Health and Safety at Work etc. Act (as amended) (HSWA) (1974)²⁹⁰;
- The Workplace (Health, Safety and Welfare) Regulations (1992)²⁹¹;
- The Gas Safety (Management) Regulations (1996)²⁹²;
- The Lifting Operations and Lifting Equipment Regulations (1998)²⁹³;
- The Management of Health and Safety at Work Regulations (as amended) (1999)²⁹⁴;
- The Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) (2002)²⁹⁵;
- The Control of Substances Hazardous to Health Regulations (COSHH) (2002)²⁹⁶;
- Civil Contingencies Act (2004)²⁹⁷;
- The Regulatory Reform (Fire Safety) Order (2005)²⁹⁸;

²⁸⁷ UK Government (2015) The Control of Major Accident Hazards Regulations 2015

²⁸⁸ UK Government (1996) The Pipelines Safety Regulations 1996

²⁸⁹ UK Government (2015) The Planning (Hazardous Substances) Regulations 2015

²⁹⁰ UK Government (1974) Health and Safety at Work etc. Act 1974

²⁹¹ UK Government (1992) The Workplace (Health, Safety and Welfare) Regulations 1992

²⁹² UK Government (1996) The Gas Safety (Management) Regulations 1992

²⁹³ UK Government (1998) The Lifting Operations and Lifting Equipment Regulations 1998.

²⁹⁴ UK Government (1999) The Management of Health and Safety at Work Regulations 1999.

²⁹⁵ UK Government (2002) The Dangerous Substances and Explosive Atmospheres Regulations 2002.

²⁹⁶ UK Government (2002) The Control of Substances Hazardous to Health Regulations 2002.

²⁹⁷ UK Government (2004) Civil Contingencies Act 2004.

²⁹⁸ UK Government (2005) The Regulatory Reform (Fire Safety) Order 2005.

- The Building Regulations (2010)²⁹⁹;
- CDM Regulations (as amended) (2015)²⁴;
- The Environmental Permitting (England and Wales) Regulations (EPR) (2016)²³;
- The Overarching NPS for Energy (EN-1) (2024)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (2024)²⁷;
- The PPG (2023)³⁵;
- SBC Local Plan (2019)³⁰;
 - Policy EG4 - Seal Sands, North Tees and Billingham
- National Risk Register (NRR) (2023)³⁰⁰;
- IEMA Major Accidents and Disasters in EIA: A Primer³⁰¹ ('the IEMA Primer') (2020);
- Emergency Preparedness guidance on part 1 of the CCA (the 'CCA risk assessment framework') (2021)³⁰²;
- Chemicals and Downstream Oil Industries Forum (CDOIF) 2016 Guidelines, Environmental Risk Tolerability for COMAH Establishments (2015)³⁰³;

²⁹⁹ UK Government (2010) The Building Regulations 2010.

³⁰⁰ UK Government (2025) Guidance: National Risk Register 2023. Available at: <https://www.gov.uk/government/publications/national-risk-register-2023> [Accessed 22/01/2025].

³⁰¹ Institute of Environmental Management and Assessment (2020) Major Accidents and Disasters in EIA: A Primer. Available at: https://www.iema.net/media/brbdeibt/j27374_iema_major_accidents_disasters_final-1.pdf [Accessed 22/01/2025].

³⁰² UK Cabinet Office (2021) Emergency Preparedness. Available at: <https://www.gov.uk/government/publications/emergency-preparedness> [Accessed 22/01/2025].

³⁰³ Chemical and Downstream Oil Industries Forum (2015) Guideline Environmental Risk Tolerability for COMAH Establishments v2.0. Available at: https://www.sepa.org.uk/media/219154/cdoif_guideline_environmental_risk_assessment_v2.pdf [Accessed 22/01/2025].

- UK Government: Working with public bodies in the infrastructure planning process (including Annex G: The Health and Safety Executive) (2024)³⁰⁴;
- European Commission: Overview of Natural and Man-made Disaster Risks the European Union (EU) May Face (2020)³⁰⁵;
- HSE: Reducing Risks Protecting People decision-making process (2001)³⁰⁶; and
- Major Hazard Regulatory Model: Safety Management in Major Hazard Sectors³⁰⁷.

Consultation

- 6.10.5 No technical engagement has been undertaken to date in relation to this topic, however, the existing CATS Terminal, owned by the Applicant's parent company, is an upper tier COMAH establishment, regulated by the HSE and the Proposed Development is also likely to be subject to the COMAH Regulations. Therefore, at the detailed design stage prior to construction, safety information will be prepared for submission to the HSE, as required by COMAH 2015, describing major accident hazards (MAH) associated with the Proposed Development and demonstrating the Application of as low as reasonably practicable (ALARP) principles in overall plant design, operational control and management.
- 6.10.6 Technical engagement with the HSE will therefore be sought at the appropriate time to agree the approach to defining MAH at the Proposed Development Site (the HPF and Hydrogen Pipeline(s)). Where required, additional technical engagement will be undertaken with other technical stakeholders (e.g. Cleveland Emergency Planning team) following receipt of the EIA Scoping Opinion, prior to submission of the ES.

³⁰⁴ Planning Inspectorate (2024) Advice on working with public bodies in the infrastructure planning process, Annex G: The Health and Safety Executive. Available at: <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-eleven-working-with-public-bodies-in-the-infrastructure-planning-process/nationally-significant-infrastructure-projects-advice-note-eleven-annex-g-the-health-and-safety-executive> [Accessed 22/01/2025].

³⁰⁵ European Commission (2020) Overview of natural and man-made disaster risks the European Union may face 2020 edition. Available at: <https://op.europa.eu/en/publication-detail/-/publication/89fcf0fc-edb9-11eb-a71c-01aa75ed71a1> [Accessed 22/01/2025].

³⁰⁶ Health and Safety Executive (2001) Reducing Risks Protecting People decision-making process. Available at: <https://www.hse.gov.uk/enforce/assets/docs/r2p2.pdf> [Accessed 22/01/2025].

³⁰⁷ Health and Safety Executive (n.d) Major Hazard Regulatory Model - Safety management in major hazard sectors. Available at: <https://www.hse.gov.uk/regulating-major-hazards/assets/docs/major-hazards-regulatory-model.pdf> [Accessed 22/01/2025].

Baseline Conditions and receptors

Approach

- 6.10.7 The IEMA Primer has been utilised alongside professional judgement to undertake and inform the initial assessment and long list of risk events presented in Appendix J (Volume II).

Study area

- 6.10.8 The study area for assessment of MA&D is not defined within regulatory guidance or by using a standardised methodology. Rather, the initial MA&D study area for scoping has been limited to the area within approximately 5 km of the HPF Area and within around 5 km of the Hydrogen Pipeline (east) and (west) terminal points, using professional judgement and previous assessment of similar, comparable projects. It should be noted that this study area includes several installations regulated by the COMAH Regulations, and MAH pipelines regulated under the PSR, and that COMAH requires the consideration of 'domino' effects with neighbouring assets.
- 6.10.9 In line with the IEMA Primer the MA&D chapter of the ES will define a study area based upon the assessment on individual risk events as appropriate, and therefore may extend beyond this initial study area for scoping, to consider effects on receptors or risks from other sources using a source-pathway-receptor approach.

Existing Baseline

Natural hazards

- 6.10.10 A description of the environmental baseline of the Proposed Development is summarised in Section 2: The Site and Surrounding Area. As described in Section 6.3: Climate Change Resilience (CCR), Teesside has a temperate oceanic climate typical of the UK. The Teesside Area has infrequently been affected by extreme weather, including storm surge events along the North Sea coast most recently 2013³⁰⁸. The Environment Agency has completed Phase 1 and Phase 2 of the Greatham Creek Flood Alleviation Scheme (FAS) to respond to increasing flood risk associated with climate change, including the construction of flood embankments and upgraded defences. The susceptibility to other hazards including extreme weather will be described in the ES Chapter on CCR. As described in paragraph 2.4.11 the HPF Area is within Flood Zone 1 and the Hydrogen

³⁰⁸ Meteorological Office (2014) Winter storms, December 2013 to January 2014. Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2013/winter-storms-december-2013-to-january-2014---met-office.pdf> [Accessed 22/01/2025].

Pipeline(s) are predominantly within Flood Zones 2 and 3.

Infrastructure and Industrial Sites (Hazards/ Receptors)

- 6.10.11 The Teesside area within which the Proposed Development Site is located is a significant industrial hub with a large number of chemical, oil and gas facilities in the vicinity of the Proposed Development Site, including the HPF Area. This includes the existing CATS Terminal, located directly adjacent to the HPF Area and the Teesside Gas Processing Plant (TGPP), located adjacent to the western boundary of the HPF Area.
- 6.10.12 According to the HSE online COMAH search, there are around 28 COMAH regulated sites within the approximate 5 km study area around the HPF Area, operating across a number of industries:
- bulk and fine chemical installations, with associated operations;
 - fuel installations, including refining, storage and distribution;
 - waste storage, treatment and disposal sites;
 - water and sewage collection, supply and treatment; and
 - power generation, supply and distribution.
- 6.10.13 COMAH sites within an indicative 5 km of the HPF Area of the Proposed Development Site are summarised in Table J.2 of Appendix J (Volume II).
- 6.10.14 In addition to the search centred on the HPF Area, additional searches for COMAH sites within around 5 km of the Hydrogen Pipeline (east) and Hydrogen Pipeline (west) terminal points³⁰⁹ has also been undertaken and the results are presented in Table J.3 of Appendix J (Volume II).

Pipelines and Utilities (hazards and receptors)

- 6.10.15 In relation to, and serving additional industries than the above regulated sites, there is an extensive network of buried and above ground pipelines within the study area, including MAH pipelines regulated in accordance with the PSR. This includes the 'Link Line' and other cross-country pipelines for transporting natural gas and chemicals.
- 6.10.16 Both above and below ground electrical distribution and transmission infrastructure, including 400kV overhead lines and pylons are also located within the study area.

Nuclear Facilities

- 6.10.17 It is understood that the Proposed Development Site is located within the consultation zone of Hartlepool Nuclear Power Station (refer to ID 11in

³⁰⁹ Indicative Post code TS23 3LR, TS10 5SQ, TS6 7QW.

Table J.2 of Appendix J (Volume II)). Consultation will be undertaken with the Office of Nuclear Regulation (ONR) regarding the potential risks to the Proposed Development and any measures advised by the ONR will be incorporated into the design of the Proposed Development.

- 6.10.18 It is also understood that proposals are at an early (pre-consenting) stage in the development of four small modular reactors (SMR) planned to provide around 1GW of energy, businesses on the North Tees Group Estate.

Transport Infrastructure (hazards and receptors)

- 6.10.19 There is substantial transport infrastructure across Teesside including ports, railways and road. Teesport is located approximately 2.6 km east of the HPF Area and one of a series of major ports in Teesside offering a range of freight services. Primary roads in the study area include the A178/ Seaton Carew Road, A1185 (connecting the strategic road network (SRN) (i.e., the A19 and A689) to the Proposed Development Site), A1046 Port Clarence Road, A66/ A1053 (Greystone Road) and A1085 (Trunk Road). No operational or publicly accessible train stations are within the study area however a number of rail lines, including the Tees Valley Line Railway and the Navigator North Tees Rail Terminal (noted in Appendix J as a COMAH site) intersect the study area.
- 6.10.20 There are no major airports within 10 km of the Proposed Development Site. Teesside International Airport is located approximately 20 km south-west of the Proposed Development Site.

Anthropogenic (Human) Hazards

- 6.10.21 The risk of flooding from reservoirs is assessed in Section 6.14: Water Environment – in summary, although there are no reservoirs within the study area, in the event of a breach, reservoirs in the wider region have the potential to impact on areas of the Proposed Development Site located within the Hydrogen Pipeline (west) around Cowpen Bewley according to Environment Agency modelling forecasts.
- 6.10.22 Section 6.6: Ground Conditions outlines the location of the Proposed Development Site in relation to areas of former salt cavities (mined by solution) which created 'brinefields' used by the Teesside chemical industry in its early development. These underground caverns are now used for large volume chemical storage purposes. Subsidence risk is low, according to available desk study data.

Sensitive Receptors

- 6.10.23 It is considered reasonable to exclude certain receptor groups from the outset. Construction workers, as a receptor, have been excluded from the

assessment, because existing legal protection is considered to be sufficient to reduce any risk from major events to a reasonable level. Legislation applied to protect workers in workplaces includes:

- CDM 2015 Regulations (as amended);
- The Management of Health and Safety at Work Regulation (1999) (as amended);
- The Workplace (Health, Safety and Welfare) Regulations 1992 (as amended); and
- HSWA 1974 (as amended).

6.10.24 In addition to the infrastructure and built environment including transport infrastructure, industrial infrastructure, and energy infrastructure receptors noted above, sensitive receptor groups to a major accident and natural disaster risk event are considered to include:

- human health - private residences (and their inhabitants) within the local area (described in Section 2.4);
- community receptors, including PRow, community land, and community buildings (described in Section 6.12: Socio-economics and section 6.13: Traffic and Transportation);
- human health - local economic receptors including businesses and employees (described in Section 6.12: Socio-economics and Section 7.1: Human Health);
- statutory and non-statutory designated ecological sites, (described in Section 6.2: Biodiversity and Section 6.8: Marine Biodiversity);
- the historic and cultural environment including archaeological heritage and built heritage (described in Section 6.4: Cultural heritage);
- the water environment, (described in Section 6.14: Water Environment); and
- the interactions between the receptors above.

Future Baseline

6.10.25 The future baseline will assume the likely future conditions in the study area in the absence of the Proposed Development but considering implementation of other committed developments that are consented and likely to be constructed/ become operational prior to construction and/ or operation of the Proposed Development. This includes the additional planned improvements by the Environment Agency of their maintained Greatham Creek flood defences which are proposed to be upgraded to further protect the area of the Proposed Development Site, including emergency access road. According to the Environment Agency, the design

will consider climate change scenarios including breaches of the flood defences³¹⁰.

- 6.10.26 It is anticipated that the proximity and number of installations storing and using hazardous substances within the study area in the future baseline scenarios will be similar to those currently present. Given the highly regulated nature under the COMAH and MAH regime, in the absence of the Proposed Development, it is assumed that locally there would be a similar risk of a MA&D occurring as currently exists.

Potential Impacts

- 6.10.27 A number of potential major accident scenarios could occur during the construction, operational and decommissioning phases of the Proposed Development. An initial long list of potential MA&D scenarios has been collated and an initial screening exercise completed, to assess the potential vulnerability of the Proposed Development in relation to a MA&D risk. This is summarised in Appendix J (Volume II). Where design development is ongoing, or there is currently insufficient evidence (e.g. through consultation) to enable the risk event to be **Scoped Out**, events have been **Scoped In** on a precautionary basis. This initial long list of credible MA&D risk events will remain subject to review during design development and may therefore change as more information becomes available during the course of the ES.

Embedded Mitigation

Construction

- 6.10.28 All works will be undertaken in accordance with the CDM Regulations, including provision of appropriate pre-construction information to the appointed contractor(s), notification of construction works to the HSE prior to their commencement and provision of a Health and Safety File for the Applicant/ operator following completion of construction works.
- 6.10.29 The Final CEMP, secured as a requirement of the draft DCO, will form a key part of the embedded mitigation. A Framework CEMP will be prepared to accompany the Application and will explain how construction activities will be managed and controlled to demonstrate compliance with health, safety and environmental legislation, and other environmental permits, consents and licenses that will be required for construction of the Proposed Development. The appointed construction contractor(s) will use risk assessments, working method statements, operating procedures and apply

³¹⁰ Environment Agency (2023) Greatham North East Flood Alleviation Scheme Environmental Impact Assessment Scoping Report.

appropriate personnel training in order to minimise the risk of accidental scenarios occurring during the construction of the Proposed Development.

Operation

- 6.10.30 The designers for the Proposed Development have due regard to safety in design principles, including process safety and safeguarding from accidental scenarios. Safety measures integrated into the Proposed Development include isolation, emergency shutdown and if required, depressurisation of plant and equipment. The engineering design layout considers both on-site hazards in terms of vulnerability to a MA&D and location of facilities and receptors off-site (in terms of the potential for the Proposed Development to be a source of a MA&D risk).
- 6.10.31 A design hazard management plan is routinely prepared, and a number of hazard identification (HAZID) and hazard and operability study (HAZOP) evaluation assessments carried out on the Proposed Development during the design process and Front End Engineering (FEED) studies – this is a standard approach for the identification of hazards and the development of risk mitigation measures for preventing or otherwise minimising hazardous scenarios through appropriate design during the FEED studies that are being progressed.
- 6.10.32 Major accident assessments and studies will be prepared over the course of the design development, and a major accident prevention plan (MAPP) will be prepared at the appropriate time once inventories of hazardous materials and plant layout is understood, to inform the application for COMAH licence for the operational HPF. A COMAH licence (or variation to the existing CATS Terminal licence) from the HSE and an Environmental Permit from the Environment Agency will be required for the operation of the HPF. Both consents require a number of requirements to be fulfilled to the satisfaction of the regulators including use of appropriate control and monitoring procedures, risk assessments, management systems and control measures to minimise the risk of major accidents occurring and to minimise the effects of any such major accidents on off-site receptors as well as the operational workforce. Similarly, a MAH Pipeline Safety Notification will be required, prior to construction of the Hydrogen Pipeline.

Summary of Potential Likely Significant Effects

- 6.10.33 In the ES, the following grouped risk events from the initial long list presented in Appendix J will be **Scoped In** and subject to further screening to produce a shortlist of MA&D events that are assessed in the ES chapter:
- nuclear accident;

- fire;
- explosions;
- domino events; and
- toxic and/ or asphyxiant gas.

6.10.34 For any short-listed MA&D risk events that cannot be screened out following technical engagement and/ or additional data gathering, an assessment of the potential LSEs on receptors will be provided. It is anticipated that risks associated with the above events will be capable of being managed and/ or mitigated to ALARP. Where any additional mitigation is required, this will be described.

Proposed Assessment Methodology

6.10.35 The methodology adopted for this assessment will align with the methodology in the IEMA Primer.

Baseline Data Collection

6.10.36 The baseline conditions for the study area applicable to each topic as described in the relevant topic chapter of the ES will be used. It is not considered that any surveys or monitoring will be required to adequately identify the baseline environment.

6.10.37 In addition to the NRR additional risks that are relevant to the local area will be reviewed via the relevant Community Risk Register (CRR) i.e. the Cleveland CRR³¹¹ which provides information on emergencies that could happen within Cleveland, together with the assessment of how likely they are to happen and in the case that they do, their subsequent impacts. The key risks within the CRR that have the potential to impact that will be used to update the initial long list for the Proposed Development include:

- flooding;
- industrial site incidents; and
- hazardous material transport.

6.10.38 For each risk, the CRR sets out the causes, impacts and populations likely to be affected. The CRR then highlights the actions being taken by the four local authorities in the former Cleveland area (Redcar and Cleveland, Stockton-on-Tees, Middlesbrough and Hartlepool) to mitigate the risks and the measures that individuals can do in the case of a major event occurrence.

³¹¹ Cleveland Local Resilience Forum (2021) Cleveland Community Risk Register. Available at: <https://www.clevelandemergencyplanning.info/information-for-residents/> [Accessed 22/01/2025].

Assessment Criteria

Receptors

- 6.10.39 The sensitive receptors described in this chapter will be subject to assessment in the ES.

Impacts

- 6.10.40 The initial screening exercise undertaken to produce the longlist of risk events (Appendix J) will be given further consideration in the ES, taking into consideration the local CRR and any comments from consultees, including PINS in relation to the Scoping Opinion.
- 6.10.41 In-line with guidance from the IEMA Primer any new/ amended risk events will be screened out or into the assessment, as relevant.

Effects

- 6.10.42 The level of consequence of the risk of a major event will be determined through several factors to identify potential LSE. These are:
- geographic extent of the effects - effects beyond the Proposed Development Site boundary are more likely to be considered significant;
 - duration of effects - effects which are permanent (i.e. irreversible) or long-lasting are more likely to be considered significant;
 - severity of the effects in terms of number, degree of harm to those affected and the response effort required - effects which trigger the mobilisation of substantial civil emergency response effort are more likely to be considered significant;
 - the sensitivity of the identified receptors – criteria presented in the relevant chapters shall be used where applicable; and
 - effort required to restore the affected environment - effects requiring substantial clean-up or restoration efforts are more likely to be considered significant.

Assumptions, Limitations and Uncertainties

- 6.10.43 There is no recognised standard methodology for the assessment of major events. The IEMA Primer has been utilised alongside professional judgement to undertake and inform the assessment. The NRR used to compile the initial long list is assumed to be accurate.
- 6.10.44 This assessment is based on the preliminary design of the Proposed Development and early appraisal of potential hazards that will be refined and reappraised as the project develops.

6.11 Noise and Vibration

Overview

- 6.11.1 This Section sets out the proposed scope and methodology for assessment of noise and vibration effects of the Proposed Development. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.11.2 This Section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report and is supported by the following figures and appendices (Volume II):
- Figure 6.11.1: Construction and Operational Noise and Vibration study area; and
 - Appendix I: Environmental Sound Survey June 2024.
- 6.11.3 This section should also be read in conjunction with the following sections:
- Section 6.2: Biodiversity;
 - Section 6.13: Traffic and Transportation;
 - Section 7.1: Human Health; and
 - Appendix H: Marine Biodiversity - Underwater Noise and Vibration Technical Appendix.

Legislation, Policy and Guidance Context

- 6.11.4 The following sources of legislation and guidance will be considered in the noise and vibration impact assessment:
- Control of Pollution Act (1974)¹⁹;
 - Environmental Protection Act 1990¹⁸⁰;
 - EPR Regulations 2016 (as amended 2020)²³ and Environmental Permitting Regulations (2023)³¹²;
 - The Overarching NPS for Energy (EN-1) (2024)²⁶;
 - The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
 - The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
 - The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;

³¹² UK Government (2023) The Environmental Permitting (England and Wales) (Amendment) (England) Regulations 2023.

- The NPPF (2024)²⁷;
- Noise Policy Statement for England (NPSE) (2010)³¹³;
- PPG – Noise (2019)³¹⁴;
- SBC Local Plan (2019)³⁰:
 - Policy SD 5 – Natural, Built and Historic Environment;
 - Policy ENV 7 – Ground, Air, Water, Noise and Light Pollution;
- RCBC Local Plan (2018)³¹:
 - Policy SD 4 – General Development Principles;
- BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (2019)³¹⁵;
- Noise and vibration management : Environmental permits (2022)³¹⁶
- Method of implementation document (MID) for BS4142 (2023)³¹⁷;
- BS 5228:2009+A1:2014 Part 1 (Noise) and Part 2 (Vibration): Code of practice for noise and vibration control on construction and open sites (2014)³¹⁸;
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (2014)³¹⁹;
- BS 7445-1:2003 Description and measurement of environmental noise – Part 1; Guide to quantities and procedures (2003)³²⁰;BS 6472-1:2008

³¹³ 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 22/01/2025].

³¹⁴ Ministry of Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities (2019) Planning Practice Guidance – Noise. Available at: <https://www.gov.uk/guidance/noise--2> [Accessed 22/01/2025].

³¹⁵ BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BSI Standard Publication.

³¹⁶ Environment Agency (2022) Noise and vibration management: environmental permits – Guidance. Available at: <https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits> [Accessed 22/01/2025].

³¹⁷ Environment Agency (2023) Method of Implementation document (MID) for BS 4142 (Guidance). Available at: <https://www.gov.uk/government/publications/method-implementation-document-mid-for-bs-4142/method-implementation-document-mid-for-bs-4142#:~:text=The%20preferred%20method%20of%20BS,sound%20level%20from%20these%20measurements> [Accessed 22/01/2025].

³¹⁸ BS5228-1:2009+A1:2014 Code of Practice for noise and vibration on construction and open sites – Part 1: Noise and Part 2: Vibration. BSI Standard Publication.

³¹⁹ BS8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI Standard Publication.

³²⁰ BS 7445-1:2003 Description and measurement of environmental noise – Part 1 Guide to quantities and procedures. BSI Standard Publication.

Guide to evaluation of human exposure to vibration in buildings – vibration sources other than blasting (2008)³²¹;

- BS 7385-2:1993 Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration (1993)³²²;
- NANR45 Proposed criteria for the assessment of low frequency noise disturbance (2005)³²³;
- ISO 9613-1:1993 Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere (1993)³²⁴
- ISO 9613-2 Engineering method for the prediction of sound pressure levels outdoor (1996)³²⁵;
- Design Manual for Road and Bridges (DMRB) LA 111 Noise and Vibration (2020)³²⁶;
- Calculation of Road Traffic Noise (CRTN) (1988)³²⁷;
- World Health Organization (WHO) Environmental Noise Guidelines for the European Region (2018)³²⁸;
- WHO Guidelines for Community Noise (1999)³²⁹;
- Night Noise Guidelines for Europe (NNG) (2009)³³⁰; and
- IEMA Guidelines for Environmental Noise Impact Assessment (2014)³³¹

³²¹ BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings – vibration sources other than blasting. BSI Standard Publication.

³²² BS 7385-2:1993 Evaluation and measurement for vibration in buildings - Guide to damage levels from groundborne vibration. BSI Standard Publication.

³²³ Proposed criteria for the assessment of low frequency noise disturbance NANR45. University of Salford (2005) and Department for Environment, Food and Rural Affairs (Defra)

³²⁴ ISO 9613-1:1993 Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere

³²⁵ International Organization for Standardization (1996), ISO 9613-2:1924, Acoustics-Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors.

³²⁶ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges: LA 111 Noise and Vibration. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/cc8cfcf7-c235-4052-8d32-d5398796b364> [Accessed 22/01/2025].

³²⁷ Department of Transport (Welsh Office) HMSO (1988) Calculation of Road Traffic Noise.

³²⁸ World Health Organisation (2018) Environmental Noise Guidelines for the European Region. Available at: <https://www.who.int/europe/publications/i/item/9789289053563> [Accessed 22/01/2025].

³²⁹ World Health Organisation (1999) Guidelines for Community Noise. Available at: <https://www.who.int/publications/i/item/a68672> [Accessed 22/01/2025].

³³⁰ World Health Organisation (2009) Night Noise Guidelines for Europe. Available at: <https://iris.who.int/handle/10665/326486> [Accessed 22/01/2025].

³³¹ Institute of Environmental Management & Assessment (2014) Guidelines for environmental noise impact assessment (version 1.2).

Consultation

- 6.11.5 Consultation has been undertaken with the Environmental Health Departments of SBC and RCBC. Feedback has been gathered with regards to the methodology and locations for the environmental sound survey, as well as the overall methodology for the assessment of construction and operational noise impacts.
- 6.11.6 Following receipt of an EIA Scoping Opinion, additional technical engagement will be undertaken with the Environment Agency (who will regulate operational noise), Natural England and other key stakeholders. This engagement will aim to respond to the Scoping Opinion and agree on the approach to controlling the impact from operational noise sources, to avoid duplication of controls under the EPR Regulations.

Baseline Conditions and Receptors

Study area

- 6.11.7 An initial desk-based baseline assessment has been undertaken to gather information on existing noise and vibration sources and receptors to define the study area, which is summarised below and shown on Figure 6.11.1 (Appendix A).

Study area - direct impacts

- 6.11.8 For construction noise, a study area of 300 m around the Proposed Development construction works is considered to be appropriate to assess impacts to both human beings and ecological receptors where relevant. This study area is based on precedent from other projects and the limitations of prediction methods beyond this distance as noted in the BS BS5228-1. For construction vibration, a study area of 100 m is considered to be appropriate to assess potential construction vibration effects on people and buildings. It is unlikely that significant effects from vibration, including piling, would occur at distances greater than 100 m from construction activity.
- 6.11.9 A study area of 1 km around any new sound sources, including the proposed HPF, is proposed to assess impacts arising from operational sources of the Proposed Development.
- 6.11.10 The study area for direct impacts is presented in Figure 6.11.1 (Appendix A).

Study area- indirect impacts

- 6.11.11 Indirect effects are considered to be those arising at greater distances from the Proposed Development boundary. Indirect effects may arise as a result of changes in traffic flows on roads around the Proposed Development

during construction.

- 6.11.12 The study area for the assessment of indirect construction traffic noise effects extends along all affected roads on the surrounding network (i.e. roads which are subject to a traffic noise change of more than 1dB(A) due to one or a combination of flow, speed or composition changes). In line with DMRB LA 111, the study area will be 50 m from the centreline of such affected roads.

Existing Baseline

- 6.11.13 The HPF Area is located in Seal Sands adjacent to the existing CATS Terminal site. The sound environment around this site is of an industrial nature and the ambient sound levels are dominated by activities of the existing industrial units, with some contribution from traffic on Seaton Carew Road, other local roads and the Teesport Docks.
- 6.11.14 With regards to the Hydrogen Pipeline, the proposed works within the Hydrogen Pipeline (west) extend from Seal Sands to Cowpen Bewley to the west, running south of the A1185 and parallel to the eastern side of Cowpen Bewley Road. Within the Hydrogen Pipeline (east), the proposed works extend from the River Tees to Wilton International Industrial Estate within Lazenby, in proximity to the communities of Dormanstown and Kirkleatham. The sound environment within the Hydrogen Pipeline(s) area is a mixture of urban and industrial nature, with the main sound sources being road traffic on the A1185, A174, A1085, industrial units alongside the River Tees and the railway lines from Redcar Central to South Bank (north of Middlesbrough).
- 6.11.15 NIA are locations in England where the population is exposed to high levels of noise and therefore are more sensitive than other areas to any increase in noise. The Defra strategic noise mapping³³² identifies the following road traffic NIA within 1 km of the Proposed Development Site:
- 10102 on the A1042 to the east; and
 - 6726 on the A174 to the south.
- 6.11.16 There are no railway NIA in close proximity to the Proposed Development Site.
- 6.11.17 As noted in Section 2 of this Scoping Report, the Proposed Development Site is predominantly located within industrial land and is generally remote from residential receptors. The closest residential receptors to the Hydrogen Pipeline (west) are located to the north-west, within the village of Cowpen

³³² Department for Environment, Food & Rural Affairs (2022) Strategic noise mapping (2017). Available at: <https://www.gov.uk/government/publications/strategic-noise-mapping-2019> [Accessed 22/01/2025].

Bewley. To the south-east of the Proposed Development Site, the closest residential receptors to the Hydrogen Pipeline (east) are located on Wilton Avenue near Dormanstown. Other residential receptors in close proximity to the Hydrogen Pipeline (east) include Kirkleatham village to the south and Warrenby (within Redcar) to the east. There is also a residential receptor to the north-west at Marsh House Farm in Warrenby, within the HBC jurisdiction.

- 6.11.18 There are non-residential receptors located in close proximity to the Proposed Development Site, including offices of the existing industrial developments, recreation facilities including PRow, educational facilities (schools) and healthcare facilities. These are outlined in Table 2.2.
- 6.11.19 There are a number of ecology receptors immediately adjacent and in close proximity to both the HPF Area and Hydrogen Pipeline(s). These are set out in Section 2 (Table 2.1 and Table 2.3).
- 6.11.20 Other statutory and non-statutory biodiversity sites are located at greater distances. Terrestrial biodiversity receptors are described in Section 6.2: Biodiversity and marine biodiversity receptors are described in Section 6.8: Marine Biodiversity of the EIA Scoping Report and presented on accompanying figures to those sections.

Baseline Sound Monitoring

- 6.11.21 Initial baseline sound monitoring was undertaken in March 2024 at a number of noise sensitive receptors (NSR) following initial consultation with the SBC and RCBC. The results of the initial survey and the survey locations are presented in Appendix I: Environmental Sound Survey June 2024 (Volume II). Additional surveying may be undertaken during preparation of the PEIR/ES following technical engagement on the EIA Scoping Opinion.

Future baseline

- 6.11.22 The future baseline of the Proposed Development Site has the potential to change as a result of the construction and operation of nearby local developments with significant sources of noise. This includes any new industrial sources within the Seal Sands Industrial Estate that are already consented or may be consented and developed in the future (although this is difficult to forecast). Section 5.2: Cumulative and Combined Effects and its accompanying Appendix C: Initial Long List for Cumulative Effects Assessment summarises potential relevant committed developments that will be considered.
- 6.11.23 The future baseline may also be subject to change due to changes in road traffic resulting from other local developments, although it is noted that there are no residential receptors within 300 m of the HPF Area.

Potential Impacts

Construction

- 6.11.24 Whilst information about the construction methodology and phases of construction work are not fully developed, it is likely that the construction works may give rise to the following temporary adverse impacts:
- temporary increase in construction activity noise within the HPF Area, Hydrogen Pipeline(s), Wastewater Connection Corridor, Effluent Water Connection Corridor and Indicative Construction Laydown Areas;
 - temporary increase in construction vibration; and
 - temporary increase in construction traffic noise along the affected road network, including construction haul routes.
- 6.11.25 Although construction activities will typically be undertaken during the daytime, it is anticipated that some activities may require to be undertaken in the evening/ night-time e.g. activities that cannot be stopped including dewatering, concrete pours, trenchless crossings, etc. Some activities may also need to be undertaken outside daytime hours due to programme constraints, if activities do not give rise to unacceptable noise impacts. However, potential adverse impacts may be mitigated through the Final CEMP (a Framework of which will accompany the Application).

Operation

- 6.11.26 Noise will be carefully considered in the ongoing design of the Proposed Development. Permanent operational noise impacts associated with the Proposed Development are anticipated to be largely related to the HPF Area and include fixed large plant and equipment operating continuously (e.g. compressors, turbines, pumps and fans within the HPF Area) and intermittently (start-up and shutdowns and venting via the flare(s)). Impacts from these sources have the potential to occur at the closest existing NSR.
- 6.11.27 Vibration impacts associated with operational activities are considered unlikely as the Proposed Development will be designed to minimise vibration, using appropriate control equipment, where required and due to the distance from any sensitive receptors.
- 6.11.28 As noted in Section 3, the Proposed Development is unlikely to result in a significant increase in traffic flows. Throughout the operational phase of the Proposed Development, it is expected to function 24-hours a day for seven days per week. During Phase 1, the existing CATS Terminal operational workforce of approximately 80 personnel will increase to 120 – 130 workers, and then following construction of Phase 2, the workforce could increase to 130 – 150 staff employed on-site serving the existing CATS Terminal and

HPF. Some HGV movements associated with delivery of consumables and removal of waste products are also anticipated and these will be quantified in the ES. During major turnarounds/ planned maintenance periods, which are likely to occur approximately every 4 years, it is envisaged that there could be up to 150 - 200 additional temporary personnel on-site although these are expected to be short-term requirements over approximately 28 days. On this basis, Section 6.13 proposes to scope out operational road traffic (following consultation with the relevant highway authorities) given that the volume generated by the Proposed Development is not considered to require an assessment of the operational phase within the ES.

- 6.11.29 On this basis, it is considered unlikely that this relatively small number of vehicle movements would result in considerable changes to noise emissions from existing roads and adverse significant effects are unlikely to occur from operational road traffic noise. Therefore, operational road traffic noise is proposed to be **Scoped Out** of further assessment.

Decommissioning

- 6.11.30 The impacts and effects of decommissioning the Proposed Development infrastructure are anticipated to be similar to those associated with construction. The PEIR/ ES will provide a general description of the activities and works (including the anticipated duration) which are likely to be required during decommissioning. Where any LSEs have been identified for construction stage activities, the chapter will consider whether similar LSEs could occur during decommissioning.
- 6.11.31 Changes to baseline information that could happen in the intervening period would be addressed via the production of a DEMP, which will be developed and agreed with the Environment Agency at the appropriate time.

Embedded Mitigation

Construction

- 6.11.32 The Framework CEMP that accompanies the Application will provide an overview of proposed construction methods and associated management measures, including proposals for management of LSEs at sensitive receptors.
- 6.11.33 Mitigation for construction activities would consider the predicted noise and vibration impacts of the Proposed Development and aim to avoid likely significant adverse effects. This would include the use of best practicable means (BPM) as outlined in in Section 72 of the COPA 1974 and Section 79 of the Environmental Protection Act 1990¹⁸⁰ such as:
- the selection of quiet and low vibration equipment;

- construction plant would be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate O&M programmes which reduce noise and vibration emissions;
- all vehicles and plant would be switched off when not in use;
- review of construction programme and methodology;
- consideration of location of noisy equipment on site;
- control of working hours and avoidance of working in the more sensitive evening and night-times where LSEs are predicted;
- the provision of acoustic enclosures and the use of less intrusive alarms (e.g. broadband vehicle reversing warnings);
- screening of equipment, perimeter hoarding and/ or temporary use of stockpiles; and
- noise control toolbox talks for site operatives.

6.11.34 Controls in relation to ecological receptors that differ from those for human receptors are set out in Section 6.2: Biodiversity and Section 6.8: Marine Ecology.

6.11.35 The Framework CEMP that accompanies the Application will provide a framework of measures and principles to be considered and developed further by the appointed contractor in the Final CEMP. The Final CEMP will be secured through requirement of the draft DCO.

Operation

6.11.36 The HPF including generating station (Phase 2 of the Proposed Development) will be operated in accordance with an Environmental Permit, issued and regulated by the Environment Agency. This will require operational noise to be controlled through the use of BAT, which will be determined through the Environmental Permit application. Measures will follow the hierarchy set out in the Environment Agency: Noise and vibration management: environmental permits guidance³¹⁶ and include:

- Prevent the generation of noise at source by good design, site layout and maintenance.
- Minimise or contain noise at source by following good operational techniques and management practice.
- Use effective silencers, physical barriers or enclosures.
- Use sympathetic timing to control unavoidably noisy operations.
- Where possible, increase the distance between the source and receptors.

Decommissioning

- 6.11.37 Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a DEMP to control noise effects. This is proposed to be secured by a requirement in the draft DCO.

Summary of Potential Likely Significant Effects

- 6.11.38 Table 6.57 provides a summary of the noise and vibration elements that are proposed to be **Scoped In** or **Scoped Out** from the assessment, along with a justification for such decision.

Table 6.57: Noise and vibration elements scoped in or out of future environmental impact assessment

Element	Phase	Scope d In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline(s)				
Construction noise assessment	Construction	✓		Construction activities have the potential to result in adverse noise impacts upon NSR.
Construction vibration assessment	Construction	✓		Construction activities have the potential to result in adverse vibration impacts upon NSR.
Construction traffic noise assessment	Construction	✓		Construction traffic noise has the potential to result in adverse impacts upon NSR.
Construction traffic vibration assessment	Construction		✓	Construction traffic vibration is unlikely to result in significant effects upon NSR.
Operational noise assessment (stationary sources)	Operation	✓		Operational noise has the potential to result in adverse impacts upon NSR
Operational vibration assessment	Operation		✓	No anticipated operational vibration increase sufficient to cause impact on NSR
Operational road traffic noise assessment	Operation		✓	Given the magnitude of change, no anticipated operational road traffic noise increase which would result in a LSE
Decommissioning noise and vibration assessment	Decommissioning	✓		Decommissioning activities have the potential to result in adverse noise impacts

Proposed Assessment Methodology

Baseline Data Collection

- 6.11.39 Environmental sound level surveying will be undertaken at locations representative of existing NSR. The location of surveys will be consulted with relevant stakeholders. Surveys will be undertaken in accordance with BS 7445-1:2003 and follow the guidance presented in the Green Book: Environmental Noise Measurement Guide³³³. Meteorological measurements will be taken in parallel with sound level measurements, to verify that appropriate conditions prevail during the surveys.

Construction and decommissioning activity noise

- 6.11.40 The assessment of construction noise will be undertaken in line with the methodologies presented in BS5228-1. The assessment will be carried out for the construction works that may cause the greatest impact within each phase of works at the closest NSR. This includes demolition/decommissioning works, ground works and excavation, trenching for pipeline network, concrete pouring, piling, haul roads, erection of structures, alterations to roads and construction compounds.
- 6.11.41 The construction noise predictions will be based on information available at the time of writing, including the sound power level of construction plant items, percentage of on-time operation, number of items and any partial screening that could be implemented. In the absence of detailed information, assumptions will be made based on benchmarking and experience from other similar projects.
- 6.11.42 Annex E of BS 5228-1 describes the 'ABC' method of assessment, which is proposed to establish the threshold of potential significant impacts. These thresholds are based on baseline environmental sound measurements and predicted construction noise levels at locations representative of sensitive receptors.
- 6.11.43 The potential impacts associated with decommissioning activities are likely to be comparable to those for construction activities.
- 6.11.44 Having established whether there is a potential significant effect using the 'ABC' method, the final assessment of significance is made by considering the following:
- exceedance over the established thresholds of potential significant effect;
 - the levels of noise exposure and character of existing noise environment;

³³³ Association of Noise Consultants (2021) Green Book: Environmental Noise Measurement Guide, 2nd Edition.

- the sensitivity of receptors;
- combined exposure to construction noise and vibration;
- the duration of the construction impact;
- effectiveness of mitigation measures that may be provided; and
- professional judgement.

Construction vibration

- 6.11.45 Vibration generated by construction activities will be assessed according to BS5228-2, which presents guidance on the assessment of vibration impacts upon human receptors and risk of building damage. Once the levels of vibration due to the proposed construction works have been established, an assessment of significance will be made according to Annex B of BS5228-2. The predicted vibration levels will be used to screen the requirement for further investigation using BS6472-1 and BS7385-2.
- 6.11.46 The identification of LSE will be based upon:
- likelihood of exceedance over the established thresholds of significant effect;
 - the sensitivity of receptors;
 - the duration of the construction vibration impact; and
 - professional judgement.

Construction traffic noise

- 6.11.47 Construction traffic noise predictions will be undertaken in accordance with the methodology defined in CRTN and in DMRB LA 111. The results of the predictions will be used as a screening exercise to evaluate whether changes in traffic flow and composition during construction works are likely to give rise to a noise level change of more than 1dB(A); this being the lowest perceptible change in road traffic noise.
- 6.11.48 The identification of LSEs will be based upon:
- the change in traffic noise levels resulting at assessed receptors;
 - the levels of noise exposure and character of existing noise environment;
 - the sensitivity of receptors;
 - the duration of the construction traffic impact; and
 - professional judgement.

Operational noise

- 6.11.49 Noise emissions from operational noise sources will be undertaken in

accordance with the methodology presented in BS 4142. To estimate the rating level of new sources, a three-dimensional noise model will be developed in the proprietary noise modelling software SoundPlan 9.

6.11.50 Operational noise sources include:

- HPF including compressors, building services such as fans and air handling units, ASU, cooling towers, pumps, flare stack, PSA system;
- CO₂ export connection AGI (to transport CO₂);
- noise sources such as turbines within the generating station (Phase 2);
- electrical substations;
- noise from flaring/ venting;
- noise from heavy vehicles, e.g. delivery lorries; and
- car parking and loading bay noise.

6.11.51 Additional consultation with relevant stakeholders will be undertaken to agree on the noise limits for operational noise sources, including noise criteria for ecology receptors. Where appropriate, reference will be made to NANR45 for the assessment of low frequency noise. The identification of a LSE will be based upon:

- likelihood of exceedance over the established thresholds of significant effect;
- level and character of the existing noise environment;
- the sensitivity of receptors; and
- professional judgement.

Assumptions, Limitations and Uncertainties

6.11.52 This section has been collated based on a range of publicly available data and information only. It is assumed that the data collated are accurate. The data will be supplemented with additional data as part of the EIA process.

6.11.53 In the absence of data, a precautionary approach has been taken and professional judgement, based on experience of similar projects, has been used where required to inform the scope of the assessment.

6.12 Socio-economics

Overview

6.12.1 This Section sets out the proposed scope and methodology for assessment of the socio-economic effects of the Proposed Development. This has been informed by an overview of the environmental baseline conditions, along

with the anticipated key issues likely to be associated with the Proposed Development.

6.12.2 This Section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report. Figure 6.12.1: Socio-economic baseline (Appendix A) accompanies this section which is further supported by the following pictures:

- Picture 6.3: Tees Valley Economic Assessment (2022).
- Picture 6.4: Age structure across geographies (mid-2022).
- Picture 6.5: Largest sectors across Proposed Development study areas (2023).
- Picture 6.6: Highest level of qualification (Census 2021).
- Picture 6.7: Resident- and workplace-based median gross annual earnings of full-time employees (2024).
- Picture 6.8: GVA per worker (2022).
- Picture 6.9: Dwelling Tenure (Census 2021).

Legislation, Policy and Guidance Context

6.12.3 The following legislation, policy and guidance will be considered in the ES:

3. The Overarching NPS for Energy (EN-1) (2024)²⁶;
4. NPS for Energy: Appraisal of Sustainability (2023)³³⁴;
5. Nationally Significant Infrastructure Projects – Advice Note Nine: Rochdale Envelope (2018)¹⁶;
6. The Green Book: Appraisal and Evaluation in Central Government (2022)³³⁵;
7. The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
8. The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
9. The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
10. The NPPF (2024)²⁷;

³³⁴ Department of Energy Security & Net Zero (2023) National Policy Statements for Energy: Appraisal of Sustainability – Main Report. Available at: [National Policy Statements for energy: appraisal of sustainability - GOV.UK](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/115555/national-policy-statements-for-energy-appraisal-of-sustainability-main-report.pdf). [Accessed 22/01/2025]

³³⁵ HM Treasury (2022) The Green Book: Appraisal and Evaluation in Central Government. Available at: https://assets.publishing.service.gov.uk/media/6645c709bd01f5ed32793cbc/Green_Book_2022_updated_links.pdf [Accessed 22/01/2025].

- 11.PPG (2019)³⁵;
- 12.SBC Local Plan (2019)³⁰; and
- 13.Redcar and Cleveland Local Plan (2018)³¹.

Consultation

- 6.12.4 Consultation has been undertaken with affected stakeholders during the course of the Proposed Development to date. To date, no engagement has been undertaken with respect to the scope or assessment methodology for this topic; it is proposed that this be agreed via the EIA Scoping Opinion request.
- 6.12.5 No consultation has been undertaken with officers from the TVCA or local authority economic development officers. However, during subsequent project stages, in order to maximise wider socio-economic benefits and social value, engagement in relation to skills and employment plans and other relevant matters is proposed, so that the assessment draws on the latest economic intelligence and plans.

Baseline Conditions and Receptors

Study area

- 6.12.6 The Proposed Development is in the LSOA E01012198: Stockton-on-Tees 003B (Figure 6.12.1 – Appendix A). The Proposed Development LSOA boundary does not provide a sufficient and appropriate scale to assess socio-economic effects and therefore a wider study area is defined.
- 6.12.7 The Proposed Development study area (Figure 6.12.1) for the socio-economic assessment is defined as the HPF and Hydrogen Pipeline together with ‘zones of influence’, which in this case are the surrounding LSOA, as follows:
 - 6.12.8 E01012198: Stockton-on-Tees 003B;
 - E01012216: Stockton-on-Tees 003E;
 - E01012107: Redcar and Cleveland 003D;
 - E01032560: Redcar and Cleveland 003E; and
 - E01032561: Redcar and Cleveland 003F.
- 6.12.9 The socio-economic baseline indicators are assessed against regional and national averages, including Middlesbrough and Stockton Travel to Work Area (TTWA), the regional comparator (North-East England) and the national comparator (England). In total, the assessment captures the socio-economic impact of the HPF and Hydrogen Pipeline(s) at six key (geographical) areas as follows:

- Proposed Development LSOA;
- Proposed Development study area;
- Middlesbrough and Stockton TTWA;
- Local Authorities (Middlesbrough, Redcar and Cleveland, Stockton-on-Tees);
- North-East England; and
- England.

6.12.10 Table 6.58 details the data sources that have been used to inform the scoping assessment. This data is used to identify baseline conditions within the study area.

Table 6.58: Summary of data sources

Source	Date	Summary	Coverage of study area
Population Estimates, Office for National Statistics (ONS) ^{336, 337} Population projections (ONS) ^{338, 339, 340}	2022	Population estimates, including age structure (0-15, 16-64, 65+). See Picture 6.4. Population projections (2023 to 2043)	Proposed Development study area Local Authorities North-East England England
Census 2021 ³⁴¹	2021	Economic Activity: current position in total employment of population aged 16 and above.	Proposed Development LSOA Proposed Development study area North-East England

³³⁶ Office for National Statistics (2024) Lower layer Super Output Area population estimates. Available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/lowersuperoutputareamidyearpopulationestimatesnationalstatistics> [Accessed 22/01/2025].

³³⁷ Office for National Statistics (2024) Estimates of the population for the UK, England, Wales, Scotland, and Northern Ireland. Available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland> [Accessed 22/01/2025]

³³⁸ Office for National Statistics (2020) Population projections for local authorities: Table 2. Available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandtable2> [Accessed 22/01/2025].

³³⁹ Office for National Statistics (2020) Population projections – local authorities: SNPP Z1. Available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandz1> [Accessed 22/01/2025].

³⁴⁰ Office for National Statistics (2024) Zipped population projections data files, UK. Available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/z1zippedpopulationprojectionsdatafilesuk> [Accessed 22/01/2025].

³⁴¹ Nomis (2022) TS066 - Economic activity status. Available at:

<https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=2083> [Accessed 22/01/2025].

Source	Date	Summary	Coverage of study area
			England
Business Register and Employment Survey (BRES) ³⁴²	2023	Employment: sectoral mix. See Picture 6.5.	Proposed Development LSOA Proposed Development study area Middlesbrough & Stockton TTWA North-East England England
ONS ³⁴³	2023	Qualifications: current position educational attainment - highest level of qualification achieved. See Picture 6.6.	Proposed Development LSOA Proposed Development study area North-East England England
Annual Survey of Hours and Earnings ³⁴⁴	2024	Resident-based and workplace-based median gross annual earnings. See Picture 6.7.	Local Authorities North-East England England
ONS ³⁴⁵ , BRES	2022	Gross value added (GVA) and GVA per worker. See Picture 6.8.	Proposed Development LSOA Proposed Development study area Local Authorities North-East England England
Indices of Multiple Deprivation (MHCLG) ³⁴⁶	2019	Deprivation	Proposed Development study area Local Authorities
Natural England Agricultural Land Classification Maps	2010	Land Use	Proposed Development study area

³⁴² Nomis (2024) Business Register and Employment Survey: open access. Available at: <https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=189> [Accessed 22/01/2025].

³⁴³ Nomis (2022) TS067 – Highest level of qualification. Available at: <https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=2084> [Accessed 22/01/2025].

³⁴⁴ Nomis (2022) Annual Survey of Hours and Earnings. Available at: <https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?theme=25> [Accessed 22/01/2025].

³⁴⁵ Nomis (2022) UK small area gross value-added estimates. Available at: <https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=2400> [Accessed 22/01/2025].

³⁴⁶ UK Government (2019) English indices of deprivation 2019. Available at: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019> [Accessed 22/01/2025].

Source	Date	Summary	Coverage of study area
Census 2021	2021	Housing: number of dwellings and dwelling tenure. See Picture 6.9.	Proposed Development LSOA Proposed Development study area Local Authorities North-East England England
Outdoor Recreation Valuation Tool (ORVal) ³⁴⁷	2023	Recreational assets: visitor estimates and welfare value	Proposed Development Site Boundary and 250 m buffer

6.12.11 The Tees Valley Economic Assessment³⁴⁸ is the core statistical document related to economic development in the Tees Valley. The Economic Assessment is updated annually and reflects the priorities in the Tees Valley Strategic Economic plan, the Local Industrial Strategy, and the Investment Plan (see Picture 6.3 for the Tees Valley Economic Assessment Executive Summary Infographic).

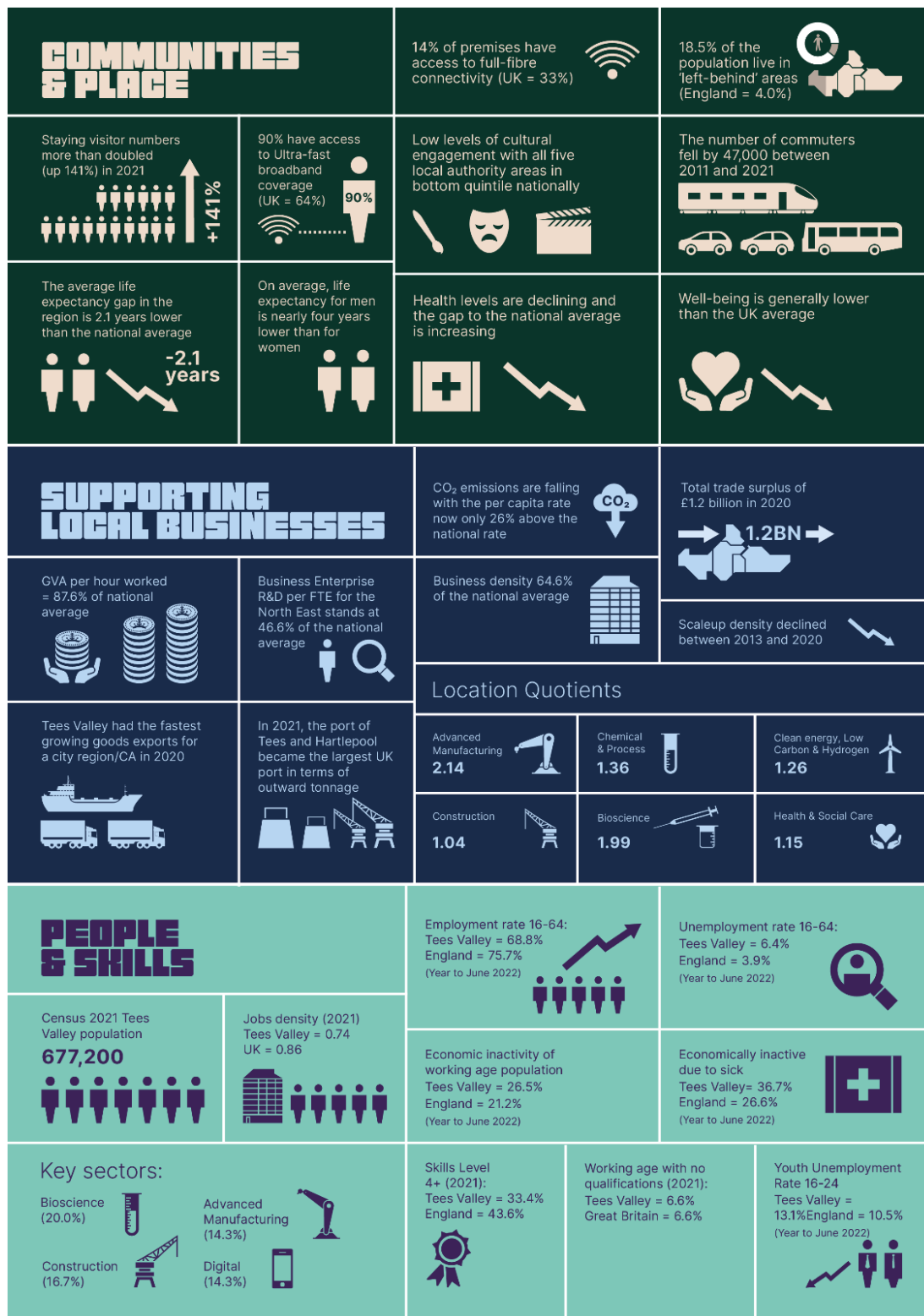
Existing Baseline

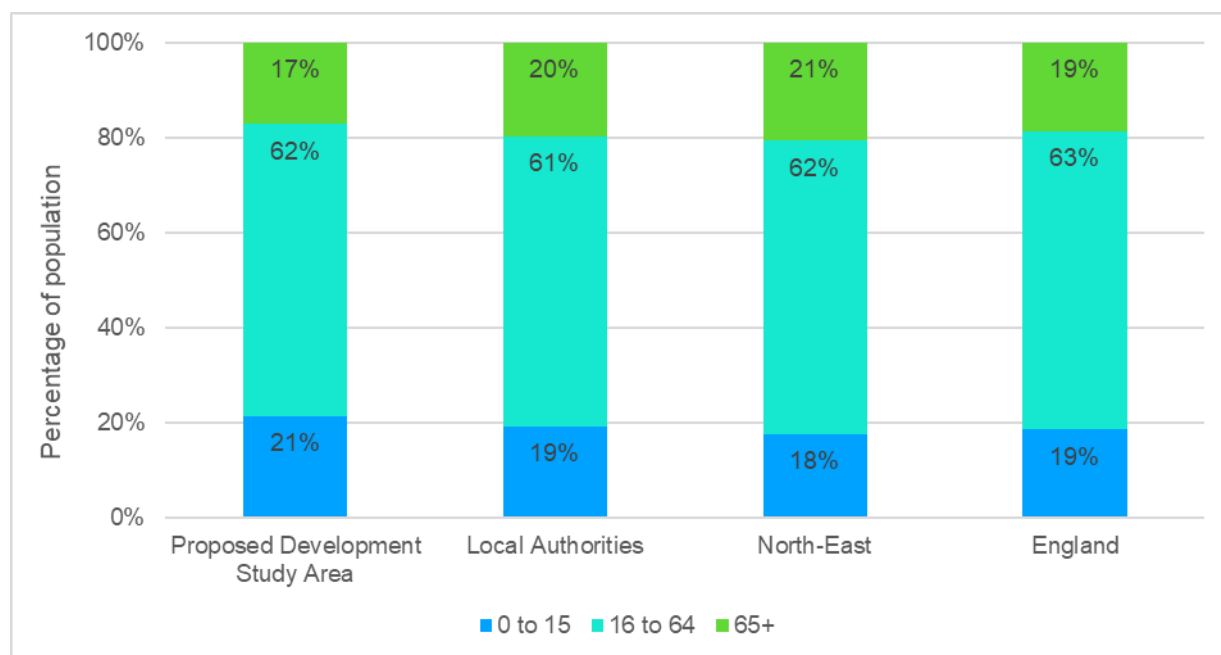
Population

- 6.12.12 In 2022, the population of the Proposed Development study area was 6,682³⁴⁶ and 62% of the population were working age (16 to 64 years of age), which was in line with the North-East England average, and slightly below the national average at the time (63%), but higher than the average across the surrounding local authorities; Middlesbrough, Redcar and Cleveland, and Stockton-on-Tees.
- 6.12.13 The proportion of elderly people (65+ years) in the Proposed Development study area was around 17% in 2022, which is lower than that of the North-East (21%) and the national average (19%)³⁴⁷. This would imply a lower elderly dependency ratio in areas closer to the HPF. The Proposed Development study area had a slightly higher population of residents below the age of 16, with 21% aged 0 to 15, compared to 19%, 18% and 19% in the Local Authorities, the North-East and England respectively. Picture 6.4 shows the age structure estimates across Proposed Development study areas.

³⁴⁷ Land, Environment, Economics and Policy Institute (2024) Outdoor Recreation Valuation Tool (ORVal: Version 2.0). Available at: <https://www.leep.exeter.ac.uk/orval/> [Accessed 22/01/2025]

³⁴⁸ Tees Valley (2022) Tees Valley Economic Assessment. Available at: <https://teesvalley-ca.gov.uk/business/market-intelligence/tees-valley-economic-assessment/> [Accessed 22/01/2025].

Picture 6.3: Tees Valley Economic Assessment (2022)


Picture 6.4: Age structure across geographies (mid-2022)

Source: Office for National Statistics (2024)

Economic Activity

- 6.12.14 In 2021, in the Proposed Development study area, about 54% of the population³⁴⁹ was economically active, with about 30% of individuals in full-time employment³⁴¹ – where full-time employment includes both full-time employees and self-employed individuals who work full-time.
- 6.12.15 Just over 46% of the population was economically inactive in the Proposed Development study area in 2021, with around 21% of the total population retired. Economically inactive students formed just 4.7% - almost 1% lower than the average for England.
- 6.12.16 In the Proposed Development LSOA, about 56% of the population was economically active in 2021, with 30.5% of the total population in full-time employment. Around 5.4% of the population was unemployed and 44% of individuals were economically inactive in 2021, with economically inactive students representing just 4% of the total population.
- 6.12.17 In the North-East, 56% of the population was economically active in 2021 and just over 32% of the population was in full-time employment. Almost 25% of the population in the North-East was retired, compared to 21.5% nationally, and the proportion of economically inactive students was marginally higher in the North-East than the national average. In England, 12% of the population was economically inactive for other reasons, such as being long-term sick or disabled or because they are looking after a home or family. This figure is significantly lower than that of the Proposed

³⁴⁹ Where “population” refers to those aged 16 and above.

Development LSOA and study area, where economically inactive individuals who are not retired or in education form 23% and 21% of the population, respectively.

- 6.12.18 In the Proposed Development LSOA, about 10% of the economically active population was unemployed and seeking employment in 2021. In the Proposed Development study area, this figure was 8%. In the North-East, just under 7% of the economically active population was unemployed but seeking employment, and, nationally, this figure was just under 6%. This suggests a relatively high level of demand for jobs in the vicinity of the Proposed Development.

Table 6.59: Economic activity status, 2021 (% of all usual residents aged 16 years and above)

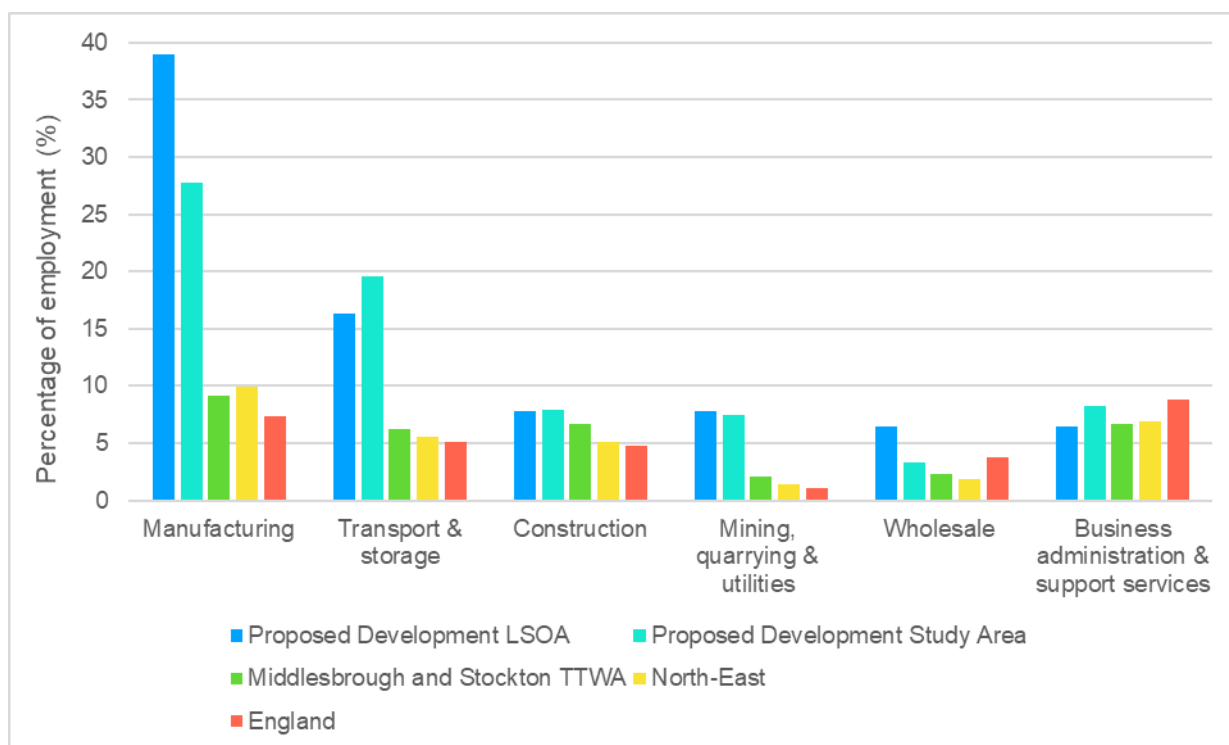
	Proposed Development LSOA	Proposed Development study area	North-East	England
Economically active	56.3	53.8	55.9	60.9
Full-Time Employee	30.5	29.7	32.4	34.6
Part-Time Employee	16.2	14.5	13.2	13.1
Self-employed	4.2	5.5	6.6	9.7
Unemployed	5.4	4.1	3.7	3.5
Full-Time Student	2.2	1.6	2.3	2.3
Economically inactive	43.7	46.3	44.1	39.1
Retired	16.9	21.0	24.6	21.5
Student	4.0	4.7	5.8	5.6
Other ³⁵⁰	22.9	20.6	13.7	12.0

Source: Office for National Statistics (2022)

Employment

- 6.12.19 As shown in Picture 6.5 the largest industry in the Proposed Development LSOA in 2023 was Manufacturing (39% of employment), followed by Transport & Storage (16%)³⁴². In the Proposed Development study area, Manufacturing was the strongest sector, making up 28% of total employment in 2023, followed by Transport & Storage (20%) and Business Administration & Support Services (8%).

³⁵⁰ "Other" includes those looking after home or family, and those who are long-term sick or disabled.

Picture 6.5: Largest sectors across Proposed Development study areas (2023)

Source: Office for National Statistics, Nomis (2024)

- 6.12.20 The employment trends in Middlesbrough and Stockton TTWA were largely aligned with that of the North-East in 2023. In the North-East, Health was the largest industry, making up 16% of total employment. Manufacturing and Education followed, representing 10% and 9% of total employment, respectively. In the Middlesbrough and Stockton TTWA, Health was the largest industry in 2023, making up 20% of total employment. Education, Manufacturing, and Retail followed, each claiming around 9% of total employment in the TTWA. Nationally, Health was the largest industry in 2023, claiming 13% of total employment.
- 6.12.21 Professional, scientific & technical jobs were the second most prevalent jobs in England in 2023, making up almost 10% of employment. Business administration & support services jobs were the third most popular, responsible for 9% of employment in England. Jobs in Retail, Education, and Accommodation and Food Services were also well represented, each comprising around 8% of total employment across England. In the Proposed Development study area, the employment percentages for Health, Retail and Education were considerably lower than the national averages in 2023, making up just 1.2%, 0.8% and 3.3% respectively.

Table 6.60: Sectoral mix: percentage of total jobs (2023)

Industry	LSO A	study area	TTW A	North-East	England
Agriculture, forestry & fishing	0.0	0.0	0.0	1.2	1.2
Mining, quarrying & utilities	7.8	7.5	2.1	1.4	1.1
Manufacturing	39	27.8	9.2	9.9	7.3
Construction	7.8	7.9	6.7	5.1	4.8
Motor trades	2.3	1.1	1.3	1.2	1.7
Wholesale	6.5	3.3	2.3	1.9	3.8
Retail	1.0	0.8	8.7	8.8	8.2
Transport & storage (including postal)	16.3	19.6	6.2	5.6	5.1
Accommodation & food services	1.0	1.0	7.2	7.7	7.8
Information & communication	1.6	1.0	2.6	3.3	4.7
Financial & insurance	0.1	0.1	1.2	1.9	3.4
Property	0.4	3.8	2.6	2.3	2.1
Professional, scientific & technical	5.9	7.8	6.7	5.8	9.7
Business administration & support services	6.5	8.2	6.7	6.9	8.8
Public administration & defence	0.3	3.8	4.1	7.0	4.2
Education	1.6	3.3	9.2	9.3	8.3
Health	0.3	1.2	19.5	16.2	13.3
Arts, entertainment, recreation & other services	1.6	1.7	4.1	4.7	4.6

Source: Office for National Statistics (2023)

Supply Chain Capacity and Capability

- 6.12.22 Several sectors may be impacted by construction and operation of the Proposed Development, including construction and engineering sectors. As shown above, the area has a relatively high concentration of construction employment which should benefit the local economy through supply chain opportunities, assuming the necessary construction and maintenance skills can be sourced from the local area.

Qualifications

- 6.12.23 Table 6.61 shows the highest level of qualification achieved by the residents (aged 16 and above) of the Proposed Development study area and wider geographies³⁴³. The data suggests that the proportion of residents in the immediate vicinity of the HPF, whose highest level of educational attainment

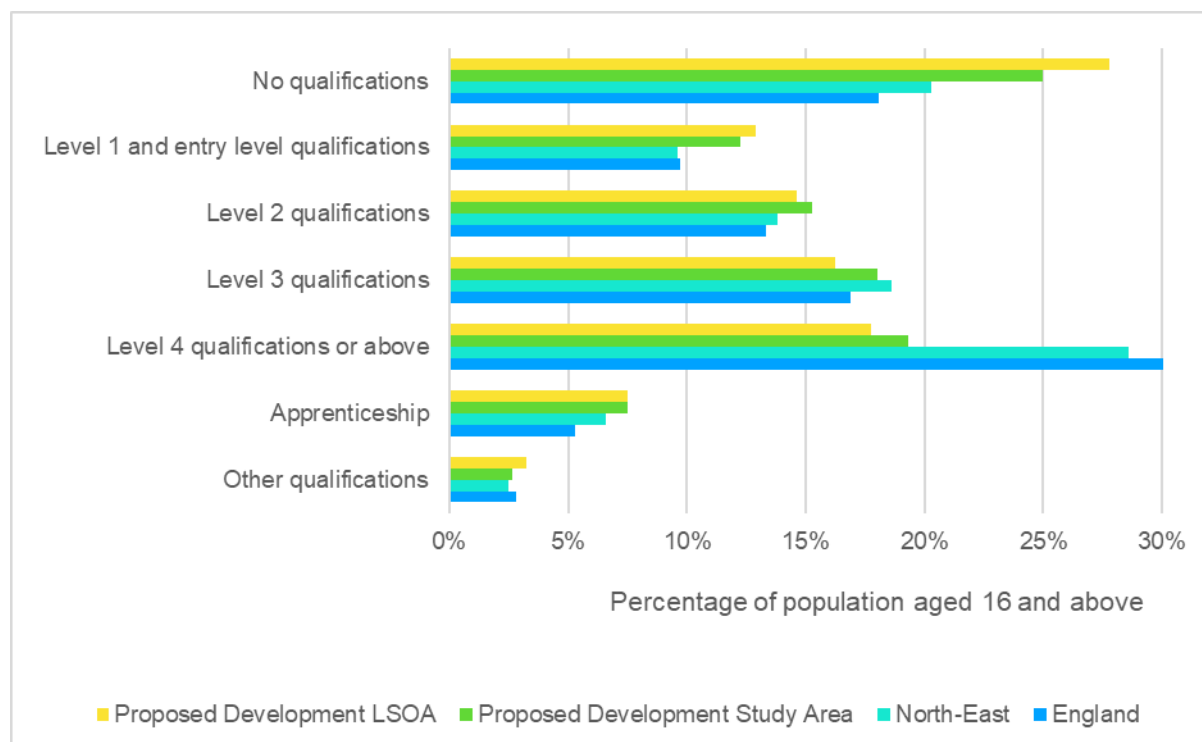
is a level 4 qualification (equivalent to an undergraduate degree), is lower than that of the wider area; the regional average is 29% and national average is 34% while the proportion of residents in the Proposed Development LSOA with a level 4 qualification or above is just 18%. The Proposed Development LSOA also has the highest proportion of residents with no qualifications which, at 28%, is 10% above the national average.

Table 6.61: Highest Level of Qualification, Census 2021

Highest level of qualification	Proposed Development LSOA	Proposed Development study area	North-East	England
Other qualifications	3%	3%	3%	3%
Apprenticeship	7%	7%	7%	5%
Level 4 qualifications or above	18%	19%	29%	34%
Level 3 qualifications	16%	18%	19%	17%
Level 2 qualifications	15%	15%	14%	13%
Level 1 and entry level qualifications	13%	12%	10%	10%
No qualifications	28%	25%	20%	18%

Source: Office for National Statistics (2023)

Picture 6.6: Highest level of qualification (Census 2021)



Source: Office for National Statistics (2023)

Earnings

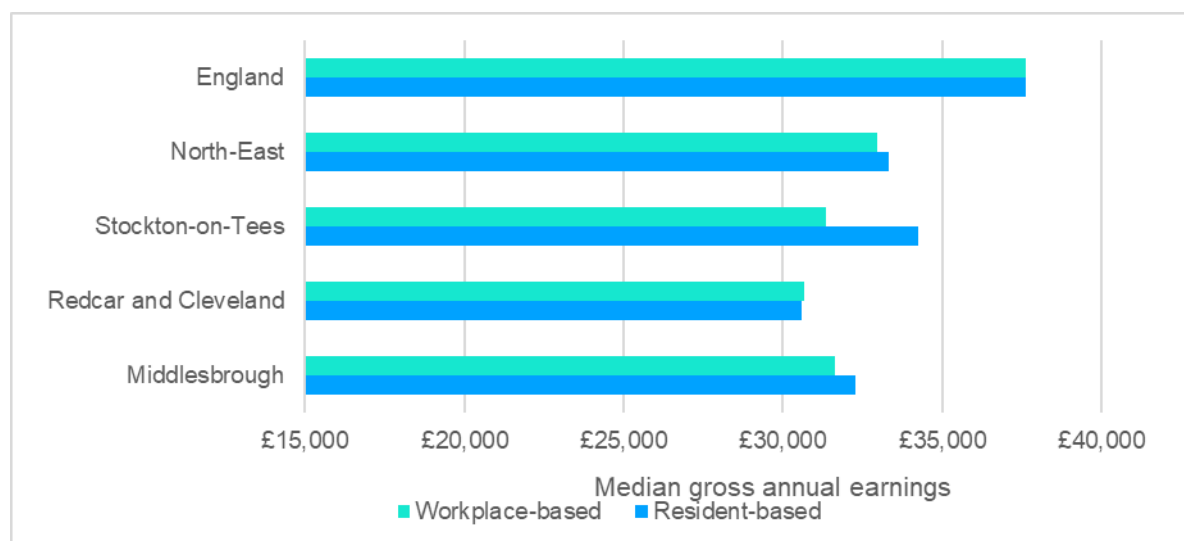
6.12.24 Table 6.62 shows the median gross annual earnings of residents in the local authorities surrounding the Proposed Development, the North-East and England, broken down into resident-based earnings and workplace-based earnings³⁴⁴. The data suggests that workplace-based earnings tend to be lower than resident-based earnings in the North-East, with Stockton-on-Tees showing the greatest discrepancy between resident-based and workplace-based earnings (a difference of £2,900). This suggests that jobs within Stockton-on-Tees pay less than jobs that the residents of Stockton-on-Tees commute to outside of the local authority. Nationally, resident-based and workplace-based earnings are very similar, with resident-based earnings just £13 lower than workplace-based earnings.

Table 6.62: Resident and workplace-based median gross annual earnings for full-time employees

Area	Resident-based earnings (£)	Workplace-based earnings (£)
Middlesbrough	£32,284	£31,638
Redcar and Cleveland	£30,595	£30,652
Stockton-on-Tees	£34,250	£31,350
North-East	£33,343	£32,960
England	£37,617	£37,630

Source: Annual Survey of Hours and Earnings (ASHE), Nomis (2024)

Picture 6.7: Resident- and workplace-based median gross annual earnings of full-time employees (2024)



Source: ASHE, Nomis (2024)

GVA

6.12.25 Table 6.63 shows the GVA and GVA per worker^{345, 342} in the Proposed

Development LSOA, study area, surrounding Local Authorities (Middlesbrough, Redcar and Cleveland and Stockton-on-Tees), the North-East and England. GVA is the value generated by any economic unit that produces goods and services. It reflects the value of goods and services produced, less the cost of any inputs used up in that production process.

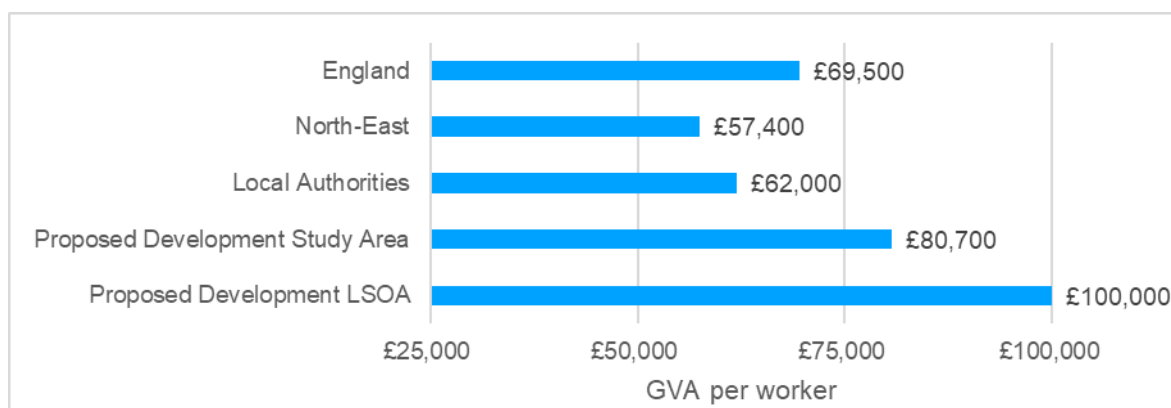
- 6.12.26 The data indicates that areas that immediately surround the Proposed Development experience higher levels of GVA per worker. This indicates that, on average, the economic activity of workers located close to the Proposed Development adds a relatively high level of value to the economy. Notably, the GVA per worker in the Proposed Development LSOA is almost double that of the North-East, and around £30,000 higher than the national average.
- 6.12.27 This is likely due to the type of industrial activity which takes place within the Proposed Development LSOA. Companies within the area include ConocoPhillips Oil Refinery, KD Pharma, the CATS Terminal and Sabic Chemicals, and the most prevalent industries in terms of employment are manufacturing; transport & storage; and mining, quarrying and utilities (see Table 6.60). In the UK in 2023, mining and quarrying had the highest level of annual output per job (£541,000); followed by electricity, gas, steam and air (£263,000); and financial and insurance activities (£189,000)³⁵¹. At the UK level, annual output per job in the manufacturing sector stood at £87,000 in 2023, which was around £25,000 higher than the national average across all sectors.

Table 6.63: GVA and GVA per worker, 2022

Area	Total GVA (millions)	GVA per worker
Proposed Development LSOA	£700	£100,000
Proposed Development study area	£1,400	£80,700
Local Authorities	£11,500	£62,000
North-East	£63,100	£57,400
England	£1,940,300	£69,500

Source: ONS, 2023; and BRES, 2024

³⁵¹ Office for National Statistics (2024) Output per Job, UK. Available at: <https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/outputperjobuk> [Accessed 22/01/2025].

Picture 6.8: GVA per worker (2022)

Source: ONS, BRES, Nomis (2024)

Deprivation

6.12.28 Measured using seven different domains of deprivation, the index of multiple deprivation (IMD) produces an overall relative measure of deprivation at LSOA level. The seven domains include:

- income deprivation;
- employment deprivation;
- education, skills and training deprivation;
- health deprivation and disability;
- crime;
- barriers to housing and services; and
- living environment deprivation.

6.12.29 Of the five LSOA that make up the Proposed Development study area, three fall within the most deprived 10% of LSOAs nationally, decile 1³⁴⁶. Of the two remaining LSOAs, one is in decile 2 and the other is in decile 5 (the least deprived decile is 10). The surrounding local authorities, Middlesbrough, Redcar and Cleveland, and Stockton-on-Tees were ranked 1st, 29th, and 39th (out of 195) respectively in terms of the proportion of LSOAs in the most deprived 10% nationally.

Land Use

6.12.30 The land on which the Proposed Development is located is predominantly in industrial use or otherwise vacant, with former construction laydown areas and tracks present relating to construction of the existing CATS Terminal. The land surrounding the HPF Area consists of existing and former sites of industrial installations north and south of the River Tees. As described in Section 6.6: Ground Conditions and shown on Figure 6.6.3: Agricultural Land Classification (Appendix A), the HPF Area falls on urban and non-

agricultural land, while the wider Proposed Development Site also covers areas of grade 4 and 5 (that is, poor to very poor) agricultural land, as well as grade 3 (moderate to good quality) agricultural land. An area of Grade 2 (very good quality) agricultural land also falls within 250 m of the Proposed Development Site. This land is situated within and to the east of the Hydrogen Pipeline (east), near Dormanstown. Overall, the land immediately surrounding the HPF is largely industrial, urban or poor-quality agricultural land.

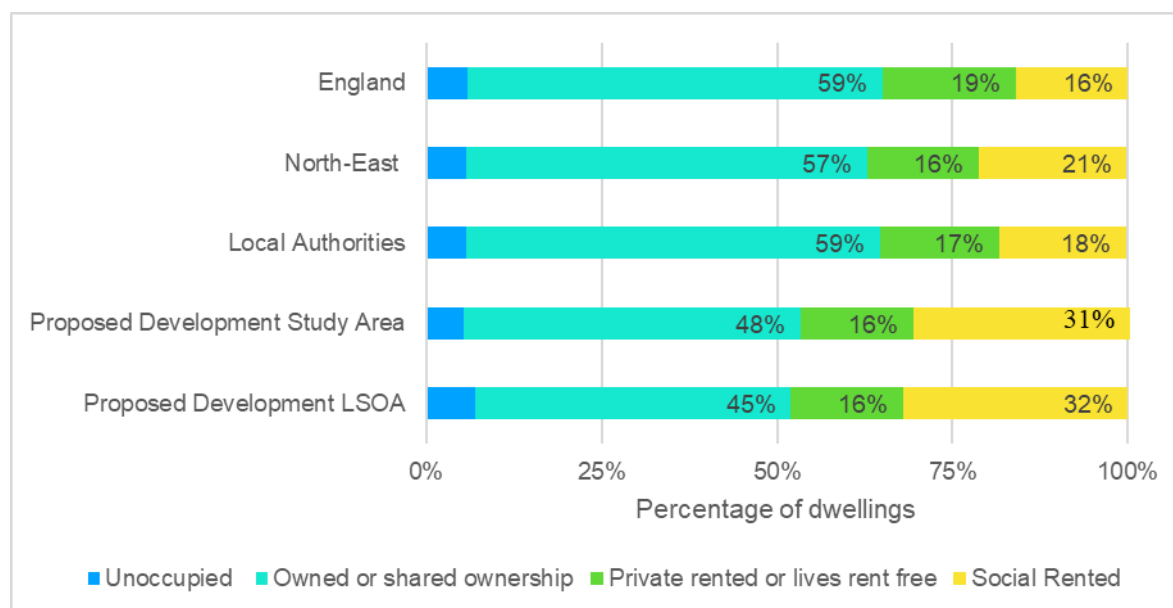
Housing

- 6.12.31 The number of unoccupied dwellings in the Proposed Development LSOA is higher than the national average, 7% compared to 6% (see Table 6.64). However, the percentage of homes that are unoccupied in the Proposed Development study area is lower than the national average, as well as that of the surrounding local authorities and North-East. The most common tenure is owned or shared ownership in all geographical areas assessed. However, the Proposed Development study area and Proposed Development LSOA have a higher proportion of social rented housing, at 31% and 32% respectively, than nearby local authorities, the North-East and England, where social housing makes up 18%, 21% and 16% of the housing stock, respectively.

Table 6.64: Housing Stock, Census 2021

Area	Total Dwellings	Proportion of Dwellings			
		Unoccupied	Owned or shared ownership	Private rented or lives rent free	Social Rented
Proposed Development LSOA	640	7.0%	45%	16%	32%
Proposed Development study area	3,060	5.4%	48%	16%	31%
Local Authorities	218,025	5.7%	59%	17%	18%
North-East	1,247,895	5.8%	57%	16%	21%
England	24,927,590	6.0%	59%	19%	16%

Source: Office for National Statistics (2023)

Picture 6.9: Dwelling Tenure (Census 2021)

Source: Office for National Statistics (2023)

Recreational Value

- 6.12.32 The Proposed Development including HPF Area and Wastewater Connection Corridor are adjacent to and partially intersect the Teesmouth NNR which is an important socio-economic asset contributing to health and wellbeing, particularly providing residents and visitors with access to nature, greenspace and beaches surrounded by one of the largest concentrations of heavy industry in Britain.
- 6.12.33 Figure 6.12.1: Socio-economics baseline (Appendix A) shows recreational assets in proximity to the Proposed Development, including beaches, golf areas and nature areas. A stretch of the North-East portion of the King Charles III England Coast Path, which runs between the Scottish Border (just above Berwick-upon-Tweed) and the Wash, passes through the Proposed Development Site Boundary. Figure 6.12.1 also identifies the Saltholme Nature Reserve and wildlife hides which, like the King Charles III England Coast Path, are important recreational assets which contribute positively to the health and wellbeing of residents and visitors. Cowpen Bewley Woodland Country Park and the NCN Route 14 are further key tourism/ recreation receptors in proximity to the HPF which should be considered in the socio-economic impact assessment of the Proposed Development.
- 6.12.34 An assessment of recreational assets, including greenspace and beaches, has been undertaken using ORVal. Identified assets are shown in Figure 6.12.1 and have been valued in Table 6.65. The recreational welfare value of the greenspace in proximity to the Proposed Development is estimated at almost £8.2 million per annum. It should be noted that estimated visits

are from ORVal, and visitor numbers will be sought from key recreational asset stakeholders, including RSPB and SBC, and reported in the ES, where provided.

Table 6.65: Recreational Assets (ORVal tool)

Orval Location ID Reference	Name	Estimated visits (per year)	Estimated Welfare Value (per year)
ID157289	Redcar Coatham	474,268	£2,574,326
ID 156922	Seaton Carew Centre	379,146	£2,162,354
ID 157478	Seaton Carew North Gare	279,220	£1,611,845
ID 560	Teesmouth NNR (Seal Sands and North Gare Sands)	116,175	£559,756
ID2251	Seaton Dunes and Common SSSI	95,685	£349,283
ID 35513	Saltholme Wildlife Reserve and Discovery Park	58,710	£202,237
ID 134	Cowpen Bewley Woodland Country Park	257,605	£712,864
Total			£8,172,665

Source: Outdoor Recreation Valuation Tool (ORVal)³⁴⁷

6.12.35 A number of PRoW intersect with the Proposed Development Site Boundary, alongside Teesdale Way (long distance route) and the England Coast Path. There is the potential for these assets to require temporary diversions during construction. Therefore, impacts to PRoW should be assessed in the EIA.

Future Baseline

6.12.36 This section outlines future socio-economic baseline conditions. The future baseline helps to identify anticipated changes to baseline conditions in the absence of the Proposed Development.

6.12.37 Data on future population projections for the Proposed Development LSOA and study area are not available as they have not been released for these areas by the ONS. In the absence of these, data from the Local Authorities, North-East and England have been used to identify future population and employment patterns.

6.12.38 Table 6.66 shows population projections for these study areas and reveals that the resident population is expected to decrease in Middlesbrough between 2023 and 2043³³⁸. Between 2023 and 2043, the populations of Redcar and Cleveland and Stockton-on-Tees are expected to increase by approximately 2.4% and 0.9%, respectively. The population in the North-East of England is expected to increase by 2.8% between 2023 and 2043, while it is estimated that the population of England will increase by 7.3%

during the same period. This reflects a relatively low level of population change in areas that map closely to the Proposed Development.

Table 6.66: Population projections (2018-based)

Area	2023	2043	Percentage change
Middlesbrough	140,037	138,656	-1.0%
Redcar and Cleveland	139,201	142,549	+2.4%
Stockton-on-Tees	199,465	201,186	+0.9%
North-East	2,693,063	2,767,140	+2.8%
England	57,557,521	61,744,098	+7.3%

Source: Office for National Statistics, 2020

6.12.39 Table 6.67 shows that, in all local authorities, the proportion of young people is expected to fall by the year 2043, while there will be an increasing population cohort aged 65 or over³³⁹. This is aligned with the North-East and England³⁴⁰ projections, which show an ageing population.

6.12.40 Of the local authorities analysed, Redcar and Cleveland is expected to experience the greatest decrease in the size of its working age population (3%). By 2043, Redcar and Cleveland's working age cohort will represent just 56% of the population. The working age cohort, as a proportion of the total population, is expected to decrease between 2023 and 2043 for all geographies, highlighting that there is expected to be a higher (elderly) dependency ratio in the future, at both a local and national level.

Table 6.67: Population projections by age cohort (2018- and 2021- based)

Area	Age cohort	2023	2043	Percentage change
Middlesbrough (2018-based)	0 to 15	20%	19%	-1%
	16 to 64	63%	62%	-1%
	65+	17%	20%	+3%
Redcar and Cleveland (2018-based)	0 to 15	18%	16%	-2%
	16 to 64	59%	56%	-3%
	65+	24%	28%	+4%
Stockton-on-Tees (2018-based)	0 to 15	19%	17%	-2%
	16 to 64	61%	60%	-1%
	65+	19%	23%	+4%
North-East (2018-based)	0 to 15	18%	16%	-2%
	16 to 64	61%	58%	-3%
	65+	21%	25%	+4%

Area	Age cohort	2023	2043	Percentage change
England (2021-based)	0 to 15	18%	16%	-2%
	16 to 64	63%	61%	-2%
	65+	19%	22%	+3%

Source: Office for National Statistics (2024).

- 6.12.41 In terms of the local economy, it would be reasonable to expect that employment and GVA will increase, associated with the expected increase in population over time. However, this is likely to be restrained by the reduction in the working age population between 2023 and 2043.
- 6.12.42 It is expected that PRoW in the area will continue to be used. Businesses and community facilities in the vicinity of the Proposed Development may open and close. It is likely that the availability of development land will gradually reduce as businesses receive planning permission to use the available sites, leading to less development land in the future. There is expected to be a gradual increase in residential properties in line with an increasing population size and government policy³⁵², while agricultural and open space land use is expected to stay the same in the future.
- 6.12.43 The future baseline is anticipated to remain largely the same as the existing baseline for tourism, recreation and socio-economics. Whilst there may be existing businesses or community facilities which close, or new facilities opening, it is not expected that there will be any perceptible changes to the economic activity, and recreational and tourism baseline conditions. Therefore, the Proposed Development should be assessed against current baseline conditions and policies.

Potential Impacts

- 6.12.44 The following sections assess the impact-receptor pathways that may potentially lead to any likely significant socio-economic effects, drawing on industry experience alongside the data insights from the baseline assessment. The potential likely significant socio-economic effects are summarised in Table 6.68, Table 6.69 and Table 6.70. The assessment identifies where further assessment is required and identifies the basis for scoping out certain effects where they are deemed not likely to be significant.
- 6.12.45 As stated in Section 7.1, Human Health, there is the potential for beneficial impacts on income and associated health and wellbeing if employment opportunities are targeted to areas of high unemployment and social

³⁵² Ministry of Housing, Communities and Local Government (2024) Housing targets increased to get Britain building again. Available at: <https://www.gov.uk/government/news/housing-targets-increased-to-get-britain-building-again> [Accessed 22/01/2025].

deprivation. Effects on employment and income, as well as measures to maximise positive benefits to the local economy, by encouraging the use of local labour manufacturers and suppliers where possible, should be considered in the socio-economic assessment.

- 6.12.46 Construction and operation of the Proposed Development may create opportunities for training and apprenticeships, which would be particularly beneficial if opportunities are targeted to areas of high unemployment and social deprivation. The socio-economic assessment should consider measures to maximise training and skills opportunities for local communities.
- 6.12.47 Given the high levels of social deprivation in the study area (as outlined in Section 7.1, Human Health), increased employment and training opportunities have the potential to lead to beneficial effects on health, wellbeing and quality of life. These potential beneficial health effects are **Scoped In** to the EIA and will be assessed in the socio-economic assessment.

Construction

- 6.12.48 Table 6.68 provides a summary of the potential likely significant socio-economic effects of the construction of the Proposed Development. As noted in paragraph 3.5.1, during construction it is currently estimated that there will be a peak of approximately 550 personnel per day employed.

Table 6.68: Potential Likely Significant Socio-Economic Effects During Construction

Activity and Impact	Potential Effect	Proposed approach to assessment (scoped in or scoped out)	Receptor	Further analysis required
Impact on employment as a result of construction of the HPF and Hydrogen Pipeline	Likely Significant Effect: Potential for expenditure on the construction of the HPF and Hydrogen Pipeline(s) to support employment in Teesside and wider Tees Valley region, through directly engaging local construction companies. The construction activity could also introduce training and	Scoped In - detailed assessment	Employment	Desk-based assessment of baseline employment conditions in sectors related to energy infrastructure construction.

Activity and Impact	Potential Effect	Proposed approach to assessment (scoped in or scoped out)	Receptor	Further analysis required
	apprenticeship opportunities, upskilling the local unemployed population, and support employment indirectly in the wider construction supply chain. Further, these increased employment and training opportunities have the potential to lead to beneficial effects on health, wellbeing and quality of life.			
Impact on GVA as a result of construction of the HPF and Hydrogen Pipeline	Likely Significant Effect: Potential for expenditure on the construction of the HPF and Hydrogen Pipeline(s) to support GVA in the region (Tees Valley) through spend on local/regional construction companies. The construction activity could also support GVA creation indirectly in the wider supply chain and through induced spending.	Scoped In - detailed assessment	GVA	Desk-based analysis and modelling using baseline GVA conditions in sectors relates to the construction of energy infrastructure.
Impact on population structure due to increased demand for labour	No Likely Significant Effect: No sustainable changes in the area's population expected due to increased demand for labour during the construction period.	Scoped Out	Population	N/A
Impact on the demand for housing, accommodation, and local services	Possible Significant Effect: Direct and indirect employment generated during the construction period could increase the demand for temporary worker housing accommodation and local services. While the impact of the	Scoped In – cumulative assessment required.	Local housing/ accommodation and services	Cumulative assessment of the impact of an increased population on housing, accommodation and local services due to projects taking

Activity and Impact	Potential Effect	Proposed approach to assessment (scoped in or scoped out)	Receptor	Further analysis required
	Proposed Development alone is expected to be minor, other projects in the Teesside area that will be ongoing during construction of the Proposed Development are likely to limit housing, accommodation and local services at this time.			place in the local area during construction of the Proposed Development. This will consider the worst-case scenario for all cumulative projects, in line with the principles of the Rochdale Envelope.
Impact on tourism economy	No Likely Significant Effect: Given the current land use of the Main Site and wider Proposed Development Site Boundary, as well as distance from notable tourism/ recreational assets, no significant changes to the number and overall expenditure by visitors to the local area is anticipated during the construction phase.	Scoped Out	Tourism Economy	N/A
Impact on recreation	Possible Significant Effect: Direct effects on recreational users as a result of the loss of amenity land, temporary closure and/or diversions of PRoWs and changes to access to recreational space including land at Cowpen Bewley Woodland Park.	Scoped In - further assessment required	Recreational Value	Desk-based research and consultation to assess impact on recreation and access to greenspace. Engagement with SBC in relation to provision of alternate open space.

Operation

6.12.49 Table 6.69 provides a summary of the potential likely significant socio-

economic effects of the operation of the Proposed Development.

- 6.12.50 Paragraph 3.2.37 - 3.2.41 describe the anticipate staff numbers during the operational phase of the Proposed Development, including maintenance turnarounds.

Table 6.69: Potential Likely Significant Socio-Economic Effects During Operation

Activity and Impact	Potential Effect	Proposed approach to assessment (scoped in or scoped out)	Receptor	Further analysis required
Impact on employment as a result of O&M of the HPF and Hydrogen Pipeline	Likely Significant Effect: Potential for expenditure on the O&M of the HPF and Hydrogen Pipeline(s) to support employment in Teesside and wider Tees Valley region, through directly engaging local companies. The O&M activity could also introduce training and apprenticeship opportunities, upskilling the local unemployed population, and support employment indirectly in the wider construction supply chain. Further, these increased employment and training opportunities have the potential to lead to beneficial effects on health, wellbeing and quality of life.	Scoped In - detailed assessment	Employment	Desk-based assessment of baseline employment conditions in sectors related to energy infrastructure O&M.
Impact on GVA as a result of the O&M of the HPF and Hydrogen Pipeline	Likely Significant Effect: Potential for the HPF and Hydrogen Pipeline(s) to support GVA in the region (Tees Valley) through spend on local/ regional O&M companies. The O&M activity could also	Scoped In - detailed assessment	GVA	Desk-based analysis and modelling using baseline GVA conditions in sectors relates to energy infrastructure O&M.

Activity and Impact	Potential Effect	Proposed approach to assessment (scoped in or scoped out)	Receptor	Further analysis required
	support GVA creation indirectly in the wider supply chain.			
Impact on population structure due to increased demand for labour	No Likely Significant Effect: No significant or permanent increase in the population or change to demographic structure as a result of the O&M of the HPF and Hydrogen Pipeline(s). Given the negligible and temporary nature of any impacts on the population structure, this impact does not meet the criteria for scoping into the socio-economic assessment.	Scoped Out	Population	N/A
Impact on the demand for housing, accommodation, and local services	No Likely Significant Effect: No increase in demand for housing, accommodation, and local services as a result of the O&M activity. Given the temporary nature of impacts on local accommodation/ services, this impact does not meet the criteria for scoping into the socio-economic assessment.	Scoped Out	Local housing/ accommodation and services	N/A
Impact on tourism economy	No Likely Significant Effect: Changes to the number and overall expenditure by visitors to the local area during the O&M phase. Given the minor and temporary nature of any impacts on the local tourism economy, this impact	Scoped Out	Tourism Economy	N/A

Activity and Impact	Potential Effect	Proposed approach to assessment (scoped in or scoped out)	Receptor	Further analysis required
	does not meet the criteria for scoping into the socio-economic assessment.			
Impact on recreation	Possible Significant Effect: Direct effects on recreational users as a result of the loss of amenity land and disruption to access to recreational greenspace.	Scoped In - further assessment required	Recreational Value	Desk-based research and consultation to assess impact on recreation, considering any alternative provision proposed.

Decommissioning

6.12.51 Table 6.70 provides a summary of the potential likely significant socio-economic effects of the decommissioning of the Proposed Development.

Table 6.70: Potential Likely Significant Socio-Economic Effects During Decommissioning

Activity and Impact	Effect	Proposed approach to assessment (scoped in or scoped out)	Receptor	Further analysis required
Impact on employment as a result the decommissioning of the HPF and Hydrogen Pipeline	Likely Significant Effect: Potential for decommissioning of the HPF and Hydrogen Pipeline(s) to induce employment in Teesside and the wider Tees Valley region. The decommissioning could also induce indirect employment in the wider decommissioning supply chain.	Scoped In - detailed assessment	Employment	Desk-based assessment of baseline employment conditions in sectors related to energy infrastructure decommissioning.
Impact on GVA as a result of decommissioning of the HPF	Likely Significant Effect: Potential for decommissioning of the HPF and Hydrogen Pipeline(s) to increase	Scoped In - detailed assessment	GVA	Desk-based analysis and modelling using baseline GVA conditions in

and Hydrogen Pipeline	GVA in the region (Tees Valley) through spend on local/ regional decommissioning companies/labour. The decommissioning could also increase GVA indirectly through the wider supply chain.			sectors relates to energy infrastructure decommissioning
Impact in population structure due to increased demand for labour	No Likely Significant Effect: no sustainable changes in the area's population expected due to changes in labour demand during decommissioning period.	Scoped Out	Population	N/A
Impact on the demand for housing, accommodation, and local services	No Likely Significant Effect: Direct and indirect employment generated during the decommissioning period could increase the demand for housing accommodation and local services, but the impact is not expected to be significant.	Scoped Out – this is because a smaller workforce is expected for decommissioning. ³⁵³	Local housing/accommodation and services	N/A
Impact on tourism economy	No Likely Significant Effect: No significant change to the number and overall expenditure by visitors to the local area during the decommissioning phase.	Scoped Out	Tourism Economy	N/A
Impact on recreation	Possible Significant Effect: Direct effects on recreational users as a result of the loss of amenity land, closure of PRoWs and disruption to access to recreational greenspace.	Scoped In - further assessment required	Recreational Value	Desk-based research and consultation to assess impact on recreation.

Embedded Mitigation

Construction

6.12.52 A Framework CEMP will be prepared to accompany the Application that will

³⁵³ Evidence suggests that decommissioning of a project requires a much smaller percentage of the total workforce (approximately 8%): “Of all the [ECI] companies surveyed... Some 42% of the workforce work on new build, just over 37% on repair and maintenance, and slightly less than 8% on decommissioning project.” https://www.ecitb.org.uk/wp-content/uploads/2019/04/LMI-2019_LabourMarketOutlook.pdf [Accessed 22/01/2025]

encompass measures to minimise the potential for likely significant adverse effects on amenity (e.g. noise, dust) associated with construction that could impact on socio-economic groups. A Framework CTMP will also accompany the Application and will identify construction traffic routing, as well as PRow and recreational routes that may be temporarily affected by the Proposed Development. Where temporary closures and diversions are required, these would be agreed in advance with relevant stakeholders to provide continued access to recreational facilities during construction. Final CEMP and CTMP would be secured via requirements of the draft DCO.

- 6.12.53 Temporary impacts on visitor attractions and open space during construction will be avoided, as far as reasonably practicable.
- 6.12.54 Impacts relating to severance would be reduced through careful siting of construction compounds and lay down areas during ongoing design development, and careful planning of construction activities through consultation with landowners.

Operation

- 6.12.55 The potential for the creation of training and apprenticeship opportunities upskilling local unemployed residents during operation will be considered, as far as reasonably practicable.

Decommissioning

- 6.12.56 The DEMP that is prepared prior to decommissioning will provide similar controls over decommissioning activities as the Framework CEMP and would be secured via requirement of the draft DCO.

Summary of Potential Likely Significant Effects

- 6.12.57 Table 6.71 provides a summary of the socio-economic elements **Scoped In** or **Out** of the EIA.

Table 6.71: Socio-economics elements scoped in or out of future environmental impact assessment

Element	Phase	Scope d In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline				
Impact on employment as a result of the HPF and Hydrogen Pipeline(s)	Construction/ Operation Decommissioning	✓ ✓ ✓		Construction, operation and decommissioning activity is expected to support local employment in an area of relatively high deprivation and unemployment. There is a potential for positive effects on wellbeing and quality of life from employment opportunities during construction and operational phases. These effects will be considered in the socio-economic assessment.
Impact on GVA as a result of operation of the HPF and Hydrogen Pipeline(s)	Construction/ Operation Decommissioning	✓ ✓ ✓		Expenditure on construction, operation and decommissioning activity is expected to support GVA in an area where productivity and GVA per job lags the national average.
Impact in population structure due to increased demand for labour	Construction/ Operation Decommissioning		✓ ✓ ✓	Population increase is temporary and at its peak during construction, but not expected to have a significant impact long-term on demographic structure.
Impact on the demand for housing, accommodation, and local services	Construction/ Operation Decommissioning	✓	✓ ✓	Similar to above, the demand on housing, accommodation and local services will be temporary and there is not expected to be any long-term impact as a result of the permanent workforce (for operational phase). However, the cumulative impact of an increased population due to construction of the Proposed Development (due to contractor numbers) in combination with other projects taking place in the local area, may have a notable, temporary impact on the demand for housing, accommodation and local services. Therefore, this element has been Scoped in for construction.
Impact on tourism economy	Construction/ Operation Decommissioning		✓ ✓ ✓	Tourism is not a significant sector in the area, with a high concentration of industrial activity, however, recreational value for

Element	Phase	Scope d In	Scoped Out	Justification
				residents and visitors would be considered further.
Impact on recreation	Construction/ Operation Decommissioning	✓ ✓ ✓		There are significant recreational assets in the vicinity of the Proposed Development which may be particularly valuable to a population surrounded by industry and also with relatively high levels of deprivation.

Impact Assessment Methodology

- 6.12.58 The analysis of local economic sector strengths and opportunities would be developed further in the next stage, including review of economic strategy and analysis covering Teesside and the wider TVCA area.
- 6.12.59 The guidance on socio-economics within the Overarching NPS for Energy (EN-1)²⁶ states that all relevant socio-economic effects should be considered. However, guidance provided on assessment methods is limited and therefore this scoping assessment considers the LSE associated with the HPF and Hydrogen Pipeline(s), by first considering the baseline conditions and main receptors.

Baseline Data Collection

- 6.12.60 Further baseline data collection will be undertaken for the ES to provide a more comprehensive overview of baseline socio-economic conditions in the local area. While it is reasonable to assume that a population increase within the Middlesbrough, Redcar and Cleveland, and Stockton-on-Tees local authority areas, in line with national trends, would be accompanied by an employment increase within these areas, it is anticipated that proportional employment across key sectors would remain consistent to the data presented. Other NSIP will be reviewed in the ES, including (but not limited to) NZT, H2Teesside, Tees Flexible Regas Port and Lighthouse Green Fuels Project at Billingham.

Assessment Criteria

Assessing economic activity and employment impacts

- 6.12.61 To quantitatively assess economic impact (such as employment and GVA impacts), the socio-economic assessment will use an economic impact model, along with the estimation of full-time equivalent (FTE) jobs, to quantify the direct, indirect, and induced employment and GVA impacts during the construction, operation, and decommissioning phases. The

model makes assumptions about the level of additionality and displacement (that is, retention of jobs and expenditure in the region) and will assess economic impacts using an approach which is consistent with the methods set out in HM Treasury Green Book (2022). It should be noted that this modelling will be done as part of the full socio-economic assessment within the ES.

Assessing demographic, housing and community impacts

- 6.12.62 To assess the impact of the HPF and Hydrogen Pipeline on demographics, housing and community impacts, the socio-economic assessment will draw on the analysis of the workforce that will be supported during the construction, operation, and decommissioning phases. The assessment will consider the implications of the Proposed Development on demographic structure, and the potential increased demand on housing and community services.

Tourism and recreation

- 6.12.63 A proportionate approach will be taken to assessing tourism and recreation impact; the Proposed Development is not expected to impact significantly on tourism given the current industrial use of the study area. However, a high-level assessment of current recreational assets in the study area has been undertaken using ORVal.
- 6.12.64 In accordance with EIA methodology, the sensitivity of each receptor will be assessed as either very high, high, medium or low, based on a review of the baseline evidence and the importance of the receptor in policy terms. The magnitude of change (or impact) to a receptor will be determined by considering the estimated deviation from the baseline once measures aimed at mitigating any adverse impacts are considered. The criteria used for assessment of the magnitude of socio-economic impacts will be evaluated as either major, moderate, minor or negligible.
- 6.12.65 Table 6.72 outlines how the sensitivity of tourism and recreational receptors is categorised.

Table 6.72: Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	The asset cannot absorb change and is of high tourism/ recreational value. The asset is of national or international importance and there are no substitutes within its catchment area.
High	The asset has limited capacity to absorb change and is of high tourism/recreational value. It may be of national or international importance, or there may be no substitutes within its catchment area.
Medium	The asset can absorb some change without significantly altering its character and is of regional importance or has some substitutes within its catchment area.
Low	The asset can tolerate change with minimal impact on its character and has low tourism/recreational value. It may be of local importance with multiple alternatives available.

6.12.66 Table 6.73 outlines how the magnitude of change in an asset's baseline condition is categorised.

Table 6.73: Magnitude of Impact

Magnitude of Effect	Description
Major	A major loss or improvement to key features of the baseline condition, resulting in a fundamental change to the asset.
Moderate	A material change to key elements of the baseline condition, altering the character of the asset but not fundamentally.
Minor	Changes are detectable but do not significantly alter the baseline.
Negligible	Changes are barely distinguishable from baseline conditions and approximate a "no change" situation.

6.12.67 The significance of the effect is evaluated by combining the sensitivity of the receptor with the magnitude of the impact.

- **Major effects** are typically considered significant under EIA Regulations.
- **Moderate effects** may also be significant, depending on professional judgment and specific circumstances, particularly when the impact is borderline.
- **Minor and negligible effects** are generally not considered significant.

6.12.68 A matrix is used to evaluate the scale of the socio-economic effects on a receptor, with the nature of the effect defined as beneficial, adverse or neutral.

Table 6.74: Classification of effects

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Low	Negligible	Negligible	Minor	Minor/Moderate
Medium	Negligible	Minor	Moderate	Moderate/Major
High	Negligible	Minor/Moderate	Moderate/Major	Major
Very High	Negligible	Moderate/Major	Major	Major

6.12.69 Based on Table 6.74 above, all shaded areas (anything other than negligible or minor effects) are considered LSE.

Assumptions, Limitations and Uncertainties

6.12.70 There is limited design information available at the time of writing the EIA Scoping Report. The assessment within the ES will be in-line with the latest available design information at the time of submission. Where design information is unknown or unavailable, worst-case assumptions will be made.

6.13 Traffic and Transportation

Overview

6.13.1 This Section sets out the proposed scope and methodology for assessment of effects of the Proposed Development on traffic and transport (T&T). This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.

6.13.2 This chapter should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report (and accompanying Figure 3.2: Key Construction Components) and is supported by the following T&T figures in Appendix A (Volume II):

- Figure 6.13.1: Traffic Survey Site Locations.
- Figure 6.13.2: Public Rights of Way.

Legislation, Policy and Guidance Context

6.13.3 The following legislation, policy and guidance will be considered in the ES:

- The Road Vehicles Order 2003³⁵⁴;
- The Overarching NPS for Energy (EN-1) (2024)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (2024)²⁷;
- SBC Local Plan (2019)³⁰:
 - Policy SD6 – Transport and Infrastructure Strategy;
- RCBC Local Plan³¹ and Local Implementation Plan for Transport in Redcar & Cleveland (2018)³⁵⁵:
 - Policy TA 1 (Transport and New Development); and
 - Policy TA 2 (Improving Accessibility Within and Beyond the Borough);
- Middlesbrough Integrated Transport Strategy 2024-2038 (2024)³⁵⁶; and
- TVCA Strategic Transport Plan 2020 – 2030 (2020)³⁵⁷.
- IEMA guidelines on the Environmental Assessment of Traffic and Movement (herein referred to as the 'IEMA Guidelines') (2023)³⁵⁸; and
- DMRB guidelines on population and human health (2020).³⁵⁹

Consultation

- 6.13.4 An online meeting was held on 4th March 2024 with the transport officers of SBC to discuss any key topics that should be considered as part of the T&T assessment, including any known issues with regards the operation of the local road network, the availability of traffic data, and potential traffic survey

³⁵⁴ 3UK Government (2003) The Road Vehicles (Authorisation of Special Types) (General) Order 2003.

³⁵⁵ Redcar and Cleveland Council (2022) Transport for the Future: The Local Implementation Plan for transport in Redcar & Cleveland. Available at: <https://www.redcar-cleveland.gov.uk/sites/default/files/2022-08/Local%20Implementation%20Plan%20for%20Transport.pdf> [Accessed 22/01/2025].

³⁵⁶ Middlesbrough Council (2024) Integrated Transport Strategy 2024-2038. Available at: <https://www.middlesbrough.gov.uk/media/tb0lptv0/mbc-integrated-travel-strategy-2024-2038.pdf> [Accessed 22/01/2025].

³⁵⁷ Tees Valley Combined Authority (2020) Strategic Transport Plan 2020-2030. Available at: <https://teesvalley-ca.gov.uk/about/wp-content/uploads/sites/2/2023/07/STP-Main-Report-Design-JaN20-4.pdf> [Accessed 22/01/2025].

³⁵⁸ Institute of Environmental Management and Assessment (2023) Environmental Assessment of Traffic and Movement. Available at: <https://www.iema.net/resources/blogs/2023/07/12/iema-guidance-ea-of-traffic-and-movement/> [Accessed 22/01/2025].

³⁵⁹ Highways England (2020) LA112 Population and Human Health. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/1e13d6ac-755e-4d60-9735-f976bf64580a> [Accessed 22/01/2025].

locations.

- 6.13.5 It was agreed that the methodology used to evaluate the potential effects of the Proposed Development on the T&T networks within the study area would follow IEMA Guidelines.
- 6.13.6 Additional points raised by SBC included confirmation that the A1185 is a commonly used and priority heavy vehicle route between the A689 and the Seal Sands 4-arm roundabout. This helped to inform the location of a series of traffic surveys that were undertaken in June 2024. Further details on these surveys and the baseline traffic data are set out in Table 6.77.

Baseline Conditions and Receptors

Study area

- 6.13.7 An initial desk-top based baseline assessment has been undertaken to gather information on the existing transport networks and services within the local area surrounding the Proposed Development Site. Specifically, information has been collected on the local road network, traffic flows, and potential constraints that may impact on, for example, potential construction vehicle routes. Further data has been collected on public transport services, and pedestrian and cycle networks.
- 6.13.8 The primary sources of information which have been used to inform this baseline assessment and to define the initial study area at scoping stage include, but have not necessarily been limited to, the following:
- observed (2024) traffic counts;
 - road network (OS, Google);
 - NCN mapping (Sustrans);
 - bus timetables (Stagecoach and Arriva);
 - road accident records (Crashmap);
 - rail network, services and station locations (National Rail);
 - affected road network for other committed developments (refer to Section 5.2: Cumulative and Combined Effects); and
 - PRoW and long distance walking routes (TVCA, Long Distance Walkers Association).
- 6.13.9 This research exercise helped to define the spatial extents of the initial study area, which has then been refined following identification of the highway links where traffic surveys at 16 separate traffic count sites were undertaken in June 2024. Further details on these surveys and the traffic data are set out in the Existing Baseline section below, with the location of each survey

site illustrated in Figure 6.13.1 (Appendix A).

Existing Baseline

Local Road Network

- 6.13.10 Based upon the location of the traffic survey locations (Figure 6.13.1), both major and minor links across the surrounding road network will be considered as part of the T&T assessment process. Included within the 16 survey sites are a number of key links located both north and south of the River Tees that will form part of this assessment. These are outlined below.
- 6.13.11 The key links or routes located north of the River Tees that will form part of the network assessment include:
- **A1185:** This operates as the primary route connecting the SRN (i.e., the A19 and A689) to the Proposed Development Site. Currently operating as an identified HGV priority route (confirmed by SBC), it consists of a two lane, 50mph carriageway in both directions, with a physical right turn island providing the northern access into the residential area of Billingham. It is proposed that this link will operate as the primary construction vehicle access route to/ from the SRN, thereby avoiding the heavily urbanised areas around Haverton Hill and along Haverton Hill Road.
 - **A178/ Seaton Carew Road:** This north-south running 'A' road provides a direct link between Seaton to the north and Port Clarence to the south. It connects into a 4-arm roundabout with the A1185, providing direct access to/ from the Proposed Development Site. While the Construction Haul Route is proposed to follow a private road which runs parallel to the A178, the final section of the Construction Haul Route will also use Seaton Carew Road and Seal Sands Road east. Combined, this will connect the HPF Area to the temporary construction laydown facility at the existing Wilton Engineering site, as shown on Figure 3.2 (Appendix A).
 - **A1046/ Port Clarence Road:** Intersected by the proposed Construction Haul Route, which will connect the Wilton Engineering site to the Proposed Development Site, this link passes a small number of residential buildings and industrial buildings. While Port Clarence Road passes High Clarence Primary School, the Construction Haul Route is proposed to use an independent parallel link, running south of the existing railway line. This means that construction vehicles are not expected to use the A1046 or pass the primary school. Nonetheless, it is proposed that Port Clarence Road will be included as part of the T&T assessment due to the high sensitivity of schools. It will also allow the traffic data required for use in the Noise and Vibration assessment to be considered (refer to Section 6.11).

- Finally, the short section of the A1046 where the Construction Haul Route passes the existing ‘Railway Cottages’ will also be included within the T&T assessment.
- 6.13.12 South of the River Tees, the main road links that are expected to be included as part of the T&T assessment include:
- **A66/ A1053:** Intersecting the 3-arm roundabout with Teesdock Road, this link takes the form of a 50mph dual-carriageway, providing access/ egress to a number of industrial sites that form part of the wider Teesworks site and associated facilities.
 - **A1053 (Greystone Road):** This link takes the form of 60mph dual-carriageway, running between the roundabout with the A174 in the south and the roundabout with the A1085 in the north. No pedestrian facilities are provided along the length of this link, with the majority of the adjacent land being brown field and/or industrialised.
 - **A1085 (Trunk Road):** intersecting the two roundabouts which provide access/ egress to the both British Steel Lackenby site and the Teesworks site; for the majority of its length this link takes the form of a 60mph dual-carriageway with pedestrian footways on either side. The majority of the land adjacent to this link is heavily industrialised with few sensitive receptors.
- 6.13.13 While the above links will be included as part of the T&T assessment, it is important to note that all 16 survey sites will undergo a screening exercise and from this, will be included or excluded from the assessment process. This screening exercise will be undertaken in accordance with the Proposed Assessment Methodology section below.
- 6.13.14 The preferred Construction Haul Route is shown on Figure 3.2 (Appendix A). This route will utilise an existing access road at Wilton Engineering, located near the Teesport and head eastwards. From here the Construction Haul Route travels along the public road past the existing Railway Cottages for approximately 100 m before turning onto an existing emergency access road off Port Clarence Road. Construction vehicles will then continue along this access road and enter the Industrial Chemicals Limited site before progressing to the access road on the west side of the Proposed Development Site. The route then continues for approximately 200 m before turning north, travelling for approximately 1.2 km, before then re-joining the public carriageway on the east-west running Huntsman Drive. Turning westwards and traveling for approximately 380 m, the route will then connect onto Seaton Carew Road (A178) before progressing north for circa 1 km towards the 4-arm Seal Sands roundabout. The route then continue along Seal Sands Road east with a turn north along the north-south access track towards the existing CATS Terminal into the Proposed HPF Area construction laydown area.

- 6.13.15 There are also a series of ‘B’ roads and/ or unclassified roads across the study area, some of which may be included as part of the T&T assessment depending upon the outcome of the initial link screening process.

Walking and Cycling

- 6.13.16 The NCN Route 14, one of the key strategic long-distance Non-Motorised User (NMU) routes is situated to the north of the River Tees and is located within the study area. This connects Billingham to the west and Hartlepool to the north-east. The section of this route which runs parallel to the A1185 currently operates as a segregated off-road path, located on the northern fringes of Billingham.
- 6.13.17 A second long-distance NMU route within the surrounding study area is the King Charles III England Coast Path which runs parallel to the A1085, south of the River Tees, connecting Redcar and Middlesbrough. It then crosses the river before turning north along Seaton Carew Road (A178) towards Seaton Carew in the north.
- 6.13.18 The remaining ‘A’ roads to/ from the Proposed Development site (i.e. the A1185) generally feature limited pedestrian and segregated cycle facilities (i.e. formal footpaths).
- 6.13.19 There are a number of other PRow both north and south of the River Tees, some of which are likely to interact with the construction and operation of the Proposed Development site. These are illustrated in Figure 6.13.2 (Appendix A).

Public Transport

- 6.13.20 Being an industrial site with relatively low levels of passenger demand, existing public transport provision to/ from the existing CATS Terminal (and therefore to the proposed HPF Area of the Proposed Development Site) is limited to the Stagecoach no. 1 service which operates along the north-south running Seaton Carew Road (A178) Table 6.75.
- 6.13.21 North of the River Tees, the nearest bus stop to the Proposed Development Site is located adjacent to the junction between the A1185 (Seal Sands Link Road) and the Seal Sands Roundabout. This may provide opportunities for site operatives and staff to access the Proposed Development Site via public transport, although it is accepted that the opportunities for this may be limited.

Table 6.75: Bus Timetable (Stagecoach)

Stagecoach service no.	Route	Daytime frequency	
		Monday – Saturday	Sunday
1	Middlesbrough – Haverton Hill – Port Clarence – Hartlepool (north)	30 mins	60 mins

6.13.22 Within the area immediately surrounding the HPF Area, south of the River Tees, a limited number of bus stops are located along the A1085, specifically, adjacent to the British Steel Lackenby site entrance, and along Broadway West/ East in Dormanstown, to the north-east of the Proposed Development Site. These stops are serviced by a number of Arriva services, as summarised in Table 6.76.

Table 6.76: Bus Timetable (Arriva)

Arriva service no.	Route	Daytime frequency	
		Monday – Saturday	Sunday
62	Redcar - Middlesbrough	30 mins	No service
X4	Redcar - Middlesbrough	30 mins	60 mins
X4A	Redcar - Middlesbrough	Hourly late service (21:00 to 23:00)	Hourly late service (19:00 – 23:00)

6.13.23 Currently, there are no operational or publicly accessible rail stations within the vicinity of the HPF Area, although the now closed British Steel Redcar railway station on the Tees Valley Line is located approximately 350 m north of the Hydrogen Pipeline (east). This station was closed in December 2019 when all services were permanently suspended.

Water

6.13.24 Consideration to using the waterborne transport will be a key consideration for the delivery of plant during construction, where reasonably practicable. It is likely that many modular units would arrive by barge from the North Sea, heading towards the River Tees. The current preferred marine offloading area is the existing quay at the Wilton Engineering site. The proposed Construction Haul Route from this quay is included in the Proposed Development Site boundary (Figure 3-2 – Appendix A). Where consideration is given to alternative ports or marine off-loading facilities, the T&T implications will be assessed in the ES.

Traffic Data and Surveys

6.13.25 To support and better understand the operation of the existing local road network, a series of traffic surveys were undertaken in June 2024. The

location of the survey sites were informed by a consultation exercise with the transport officers of SBC whereby a number of links across the local road network were identified as being of potential importance. Additional discussions were held with the design consultant in May 2024 to identify additional surveys sites that would help inform the baseline for the T&T assessment.

6.13.26 As noted earlier, a total of 16 survey sites were identified, providing a baseline of traffic flows and vehicle speeds across the study area. Details of these sites are listed in Table 6.77, and illustrated in Figure 6.13.1 (Appendix A).

Table 6.77: Traffic survey locations (2024)

Site ID	Location	Geographic co-ordinates	
		x	y
1	A689	445206	445206
2	A1185	446711	446711
3	A178 (N)	450620	450620
4	A178 (S)	450683	450683
5	Unclassified	450872	450872
6	A1046	449435	449435
7	A1085 (trunk road) A	455950	455950
8	A1053	455802	455802
9	A66	454968	454968
10	A1085 (trunk road) B	458009	458009
11	Broadway W	458206	458206
12	A1046/Port Clarence Road	448844	448844
13	Belasis Avenue (B1275)	447656	447656
14	A1032	447392	447392
15	A1046/Haverton Hill Road	447171	447171
16	New Road	447038	447038

6.13.27 Two traffic data types were collected through the survey process, namely:

- Hourly, classified, directional vehicle counts. This AADT data was collected over a continuous two-week period between Saturday 15th June 2024 and Friday 28th June 2024 (i.e. 14 days); and
- Vehicle speed data, collected on an hourly basis over the same time period as the vehicle counts.

6.13.28 The traffic flows were collected in accordance with 5 different vehicle types, then, for the purpose of the T&T assessment, were grouped into the following vehicle classifications:

- Cars and light goods vehicles (LGV); and
- Other goods vehicle 1 (OGV1³⁶⁰) / other goods vehicle 2 (OGV2³⁶¹), and buses/ coaches.

6.13.29 Table 6.4 summarises the two-way AADT survey data. The traffic surveys were commissioned for two weeks to ensure that a minimum of one continuous week of data was recorded, as well as a precaution against malfunctioning survey equipment. Table 6.79 summarises the vehicle speed data for the same survey sites.

Table 6.78: AADT traffic survey data, 2024 (two-way, vehicle numbers)

Site ID	Location	Week 1		Week 2	
		Car/ LGV	OGV1/ OGV2/ Bus	Car/ LGV	OGV1/ OGV2/ Bus
1	A689	24,041	3,863	25,010	4,573
2	A1185	3,256	1,037	4,258	1,368
3	A178 (N)	6,293	750	7,965	1,016
4	A178 (S)	6,708	1,167	6,908	1,214
5	Unclassified	2,932	805	2,853	756
6	A1046	7,470	830	7,679	834
7	A1085 (trunk road) A	16,608	1,054	15,822	1,095
8	A1053	13,156	1,159	12,344	1,100
9	A66	17,981	2,485	17,979	2,466
10	A1085 (trunk road) B	12,701	324	10,935	313
11	Broadway W	4,008	427	5,543	623
12	A1046/Port Clarence Road	8,790	1,112	8885	1,190
13	Belasis Avenue (B1275)	2,185	256	2,327	251
14	A1032	14,981	944	14,964	905

³⁶⁰ OGV1 refers to two or three axle units without a trailer (i.e. a 'tipper' style lorry, often used on construction sites)

³⁶¹ OGV2 refers to all rigid Heavy Goods Vehicles (HGV) with four or more axles, including all articulated vehicles

Site ID	Location	Week 1		Week 2	
		Car/ LGV	OGV1/ OGV2/ Bus	Car/ LGV	OGV1/ OGV2/ Bus
15	A1046/ Haverton Hill Road	13,778	1,980	13,547	2,154
16	New Road	3,039	485	3,122	482

Table 6.79: Vehicle speeds (2024), mph

Site ID	Location	Week 1		Week 2	
		Mean	85%'ile	Mean	85%'ile
1	A689	41	46	41	46
2	A1185	53	59	52	59
3	A178 (N)	48	55	48	54
4	A178 (S)	45	51	45	52
5	Unclassified	45	52	42	49
6	A1046	28	34	28	34
7	A1085 (trunk road) A	48	56	48	57
8	A1053	Insufficient data to calculate accurate speed results.			
9	A66	Insufficient data to calculate accurate speed results.			
10	A1085 (trunk road) B	43	49	41	48
11	Broadway W	28	32	28	32
12	A1046/Port Clarence Road	29	34	29	34
13	Belasis Avenue (B1275)	39	45	39	45
14	A1032	34	39	36	42
15	A1046/ Haverton Hill Road	34	39	34	39

Accident Data

- 6.13.30 The T&T assessment will include a full review of traffic accident data for the last 5 years (currently 2018 – 2022), as sourced from the ‘Crashmap’ web platform.
- 6.13.31 A preliminary data gathering exercise has already been undertaken along the A1185 corridor/ Seal Sands Roundabout and Seaton Carew Road, with

the results summarised in Table 6.80.

Table 6.80: Local accident data (2018-2022)

Location	2018	2019	2020	2021	2022
Seal Sands Roundabout/A1185	No accidents recorded	4 slight 0 serious 0 fatal	-	-	0 slight 1 serious 0 fatal
Seaton Carew Road	No accidents recorded	1 slight 0 serious 0 fatal	0 slight 1 serious 0 fatal	1 slight 0 serious 0 fatal	-
Port Clarence Road/Transporter Bridge	No accidents recorded	-	0 slight 1 serious 0 fatal	-	-

Note: 2023 and 2024 data not yet available on the 'Crashmap' platform.

6.13.32 As shown in the table above, over the course of the last five years there have been no fatal accidents on any of the three key links surrounding the Proposed Development Site. There have been three serious accidents. While the volume and level of detail of accident data presented above is insufficient to extract results which are statistically robust, it is suggested that there are no apparent accident 'blackspots' within the area immediately surrounding the Proposed Development Site.

Future Baseline

6.13.33 The indicative construction programme is outlined in 3.4.1; construction of the Proposed Development (subject to the necessary consent being granted and an investment decision being made) may commence, at earliest, in 2027 and last approximately four years (Phase 1). Under this scenario, construction traffic for Phase 1 of the Proposed Development may be generated at the same time as other major development projects within the immediate area (for example, the NZT project, for which construction activities are planned between 2025 – 2028, and the H2 Teesside project, for which construction of Phase 1 is anticipated to be ongoing until 2028, if consent is granted). A review of construction programmes for other committed developments using publicly available information will therefore be undertaken to inform the future baseline and to undertake a sensitivity test to evaluate whether a worst-case construction vehicle scenario is likely to occur during the construction of Phase 1 or under Phase 2 of the Proposed Development (which, if progressed, could commence some time after Phase 1 completion and last approximately four years per train).

6.13.34 The future baseline (including committed developments), taking into

consideration background traffic TEMPro growth factors, will be assessed within the transport assessment (TA) that accompanies the Application.

Potential Impacts

Construction

Vehicle Generation

- 6.13.35 An outline construction programme is provided in Section 3.4 of this EIA Scoping Report together with estimates of the number of construction workers (Section 3.5) and construction vehicle movements (Section 3.6). The key components of construction, including the Indicative Construction Laydown Areas and the proposed Construction Haul Route are shown on Figure 3.2 (Appendix A).
- 6.13.36 As noted in Section 3.3, construction traffic (i.e. site operatives and HGV) is expected to access the Proposed Development site from the SRN via the A1185 Seal Sands Road and the North-South Access Road. Initial discussions with SBC have confirmed that the A1185 is an established HGV priority route, with no known capacity or safety issues.
- 6.13.37 When assessing the effect of the construction vehicles on the surrounding transport networks, vehicle types will be disaggregated into non-HGV movements (i.e. cars, LGV) and HGV movements (i.e. tipper lorries, etc). The potential impacts resulting from any potential AIL movements will be assessed within the ES.
- 6.13.38 The routing of the construction vehicles will be informed by the location of the construction compounds, with the intention that all routing will be along 'A roads'/ main roads and avoiding residential areas as far as reasonably practicable. As noted in Section 3.6, the maximum number of construction HGV being generated by the Proposed Development is predicted to be up to 150 (one-way) HGV entering and exiting the site per day. However, these values are early estimates and are subject to change as both the design and construction programme progresses.
- 6.13.39 Based upon the June 2024 traffic survey data presented in Table 6.78 and assuming that *all* HGV construction vehicle movements travel to/ from the Proposed Development site via the A1185 corridor and Seal Sands roundabout, this 300 AADT equates to approximately 7% of the 2024 background traffic flows based upon observed data from week no.1 of the traffic surveys (i.e. the worst- case). In accordance with the IEMA Guidelines, this equates to an impact magnitude of 'negligible'. As above, these figures are early estimates that could be subject to change as the design progresses.

- 6.13.40 As noted in Section 3.6, the volume of worker vehicles on the network is predicted to be at its maximum of around 1,100 two-way daily vehicle movements (550 in and 550 out) during construction of Phase 1 and Phase 2. These figures are early estimates that could change as the design progresses. Furthermore, if appropriate, it is proposed that a sensitivity test will be undertaken to evaluate the potential 'worst-case' effects when peak worker trips are predicted to occur, as this time period is unlikely to coincide with the maximum HGV vehicle generation, the latter of which is expected to occur with the earthworks/ site preparation under Phase 1.

Public Rights of Way

- 6.13.41 As described in Section 2.4, there are a number of PRoW may be temporarily affected by the final routes of the proposed Hydrogen Pipeline and other spur connections that form part of the Hydrogen Pipeline. Effects on the local PRoW will therefore be assessed in the TA that accompanies the Application. This will include consideration of the potential effects resulting from temporary or permanent closures/ diversions which may be necessary during the construction (and during operation, maintenance) of the Proposed Development.

Operation

Vehicle Generation

- 6.13.42 The operational phase vehicle movements are described in paragraph 3.2.37 - 3.2.41 including staff requirements for major turnarounds/ planned maintenance periods, which are likely to occur approximately every 4 years (per train). Operational traffic is expected to enter the Proposed Development Site via Seal Sands Road and the North-South Access Road.
- 6.13.43 Overall, the volume of potential traffic expected to be generated by the Proposed Development is not considered to require an assessment of the operational phase within the ES and therefore, it is proposed that this element is **Scoped out** in consultation with the relevant highway authorities, with a qualitative statement noting that the operational traffic presented within the TA will form an appendix of the ES.

Decommissioning

Vehicle Generation

- 6.13.44 While decommissioning traffic volumes are not yet known at this stage, it is expected that they will be notably less than that of the construction traffic as there will be no cut and fill activities occurring as part of the decommissioning phase. On this basis, it is considered that undertaking an

assessment of the construction phase will provide a clear understanding of any potential impacts during decommissioning. However, in the interests of providing a robust assessment, a review of the decommissioning phase proportionate to the level of detail available at the time will be undertaken. This is expected to include a prediction of traffic flows (including the anticipated duration) which could be required during decommissioning, and which could impact on the operation of the surrounding local road network and a description of how these compare to the impacts of the construction phase.

Embedded Mitigation

Construction

- 6.13.45 A CTMP and CWMP will form part of the embedded mitigation. Framework versions of the CTMP and CWMP will be prepared and submitted to accompany the Application, providing an overview of proposed/ agreed construction (including AIL) traffic routes and a range of associated management measures, including proposals for management of any affected PRoW. The framework of measures and principles would need to be taken forward and developed further by the appointed contractor.
- 6.13.46 The CTMP will set out measures to manage construction HGV traffic and these could potentially include, but will not necessarily be limited to, the following:
- identification of construction routes for HGV;
 - restrictions on HGV during certain times of the day such as at school drop off and pick up times;
 - application of the waste hierarchy (refer to Section 6.9: Material Assets and Waste) which seeks to reduce the quantity of materials required to be transported off-site onto the local highway network through prioritising reuse and recycling;
 - measures to reduce impacts on the local community during construction, including communications such as letter and notices to residents and businesses that lie in close proximity to the HPF Area and Hydrogen Pipeline construction routes; and
 - procedures for AIL and hazardous loads.
- 6.13.47 The CWMP will be aimed at construction workers and would set out measures to reduce the impact of workers travelling to and from the Proposed Development Site. This document could potentially include initiatives such as provision of mini-buses to transport workers from defined 'pick-up' and 'drop-off' points located within the local area, measures to manage the level of on-site car parking, or measures to encourage workers

to travel by more sustainable modes of transport.

- 6.13.48 A Final CTMP and CWMP is expected to be secured by requirement of the draft DCO and prepared by the Contractor for agreement with the local highway authorities/ National Highways (where relevant) prior to commencing construction on-site.
- 6.13.49 Further details for CTMP and CWMP compliance will be expanded upon as part of the ES.

Operation and Decommissioning

- 6.13.50 There are no embedded measures proposed during the operational phase of the Proposed Development. There will be minimal impacts attributed to the operational traffic following construction of the Proposed Development.
- 6.13.51 Traffic impacts which could arise during the decommissioning phase of the Proposed Development are likely to be similar or less than the impacts expected during the construction phase and would be mitigated similarly to the measures set out in the CTMP and CWMP via a Decommissioning Plan, inclusive of a DEMP.

Summary of Potential Likely Significant Effects

- 6.13.52 **Table 6.81** provides a summary of the T&T elements that are proposed to be **Scoped In** or **Scoped Out** of the T&T assessment, along with a justification for that decision.

Table 6.81: Traffic and Transportation elements scoped in or out of environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline				
Construction traffic assessment	Construction	✓		Construction traffic movements are likely to exceed the relevant IEMA screening criteria on specific parts or links within the affected road network. The construction phase will therefore require a detailed assessment and is Scoped In .
Operational traffic assessment	Operation		✓	Based upon the anticipated volume of construction vehicles and the operational traffic flows expected to be notably lower, it is unlikely that operational traffic

Element	Phase	Scoped In	Scoped Out	Justification
				movements will exceed the IEMA Guidance screening criteria (refer to paragraph 6.13.54), and a detailed assessment is therefore Scoped Out . Agreement on this will be sought in consultation with the relevant highway authorities, with a qualitative statement regarding operational traffic presented within the TA that will form an appendix of the ES.
Decommissioning traffic assessment	Decommissioning		✓	Decommissioning is not anticipated to present any significant environmental effects beyond those that will be assessed for the construction phase of the Proposed Development. A detailed assessment at this stage is therefore Scoped Out . However, it is proposed that the TA will include a simple sensitivity test on predicted traffic flows (including anticipated duration) which could be required during decommissioning, and a description of how these compare to the impacts during the construction phase assessed.

Proposed Assessment Methodology

- 6.13.53 The assessment methodology to be used to evaluate the potential effects of the Proposed Development on the T&T networks within the study area will follow the IEMA Guidance.

Study area

- 6.13.54 The IEMA Guidance requires the following two rules to be applied as part of the initial screening exercise whereby those links that are expected to be impacted by the Proposed Development are identified:
- Rule 1: highway links where flows are predicted to increase by more than 30% and where the number of HGV is predicted to increase by more than 30% should be included as part of the full assessment; and

- Rule 2: any other particularly sensitive area(s) where traffic flows are predicted to increase by 10% or more should also be included.
- 6.13.55 The links that are subsequently identified for further assessment are based upon the following seven elements:
- severance of communities;
 - driver and passenger delay;
 - NMU delay;
 - NMU amenity (including potential impacts on core paths and cycle routes;
 - fear and intimidation;
 - road user and pedestrian safety; and
 - hazardous/ abnormal load review.
- 6.13.56 In terms of the future assessment year and the worst-case scenario, it is proposed that background traffic growth will be accommodated through the application of growth factors³⁶² derived from the DfT TEMPro tool.

Assessment Criteria

Receptors

- 6.13.57 Paragraph 1.30 of the IEMA Guidelines defines sensitive locations as receptors that are sensitive to traffic, which could include, but are not limited to: schools, hospitals, places of worship and historical buildings. The sensitivity of receptors for transport effects will be defined using the following descriptions:

³⁶² TEMPro is a program developed by the Department for Transport providing traffic growth projections used in transport models and intended to act as a nationwide standardised distribution of growth in trips.

Table 6.82: Description of sensitivity of receptors (qualitative)

Sensitivity	Definition
High	Receptors of greatest sensitivity to traffic flow increases, including those which are heavily used (by all users or particularly by vulnerable road users) relative to other receptors within the study area or those which have a low capacity to accommodate change without significant effects arising. Receptors that are most likely to be sensitive to changes in traffic flows will be categorised under 'high sensitivity'. For the purpose of the T&T assessment, this will include, but not necessarily be limited to, schools/ collages, hospitals or other similar medical facilities, accident 'blackspots', or playgrounds.
Medium	Receptors which are sensitive to traffic flow increases and used (by all users or particularly by vulnerable road users) to an average level relative to other receptors within the study area or those which have a moderate capacity to accommodate change without significant effects arising.
Low	Receptors with some sensitivity to traffic flow increases, which are lightly used (by all users or particularly by vulnerable road users) relative to other receptors within the study area or those which have a high capacity to accommodate change without significant effects arising.
Negligible	Receptors with low sensitivity to traffic flow increases, which are very lightly used (by all users or particularly by vulnerable road users) relative to other receptors within the study area or those which have a very high capacity to accommodate change without significant effects arising.

6.13.58 In conjunction with the qualitative definition of receptor sensitivity (Table 6.82), Table 6.83 identifies the methods which will be used for identifying receptor sensitivity.

Table 6.83: Identifying Receptor Sensitivity

Impact	Method
Severance of communities	Traffic flow thresholds, as set out in the DMRB LA112 guidelines on population and human health (Highways England, 2020)
Driver and passenger delay	Sensitivity descriptions as set out in Table 6.82.
Non-Motorised User delay	Traffic flow thresholds, as set out in the DMRB LA112 guidelines on population and human health (Highways England, 2020)
Non-Motorised User amenity	Sensitivity descriptions as set out in Table 6.82.
Fear and intimidation	Weighting system (IEMA, 2023) and application of a 'hazard score' which is based on AADT and average vehicle speeds. This process applies to both receptor sensitivity and the magnitude of effect. Full details will be set out within the ES.
Road user and pedestrian safety	Identification of personal injury accident (PIA) rates, with all accidents considered to having a 'high' sensitivity.
Hazardous/ abnormal load review	Qualitative review.

6.13.59 Potential traffic impacts are considered to be of high, medium, low or negligible magnitude. For each of the elements set out above, the magnitude and sensitivity of the potential effects will then be based upon the predicted changes in traffic flows, as set out in Table 6.84.

Table 6.84: Magnitude criteria

Magnitude	Magnitude Definition
High	• Total change or major alteration to key elements/ features of the baseline conditions; • Impact occurs over a large scale or spatial geographical extent and/ or is long-term or permanent in nature; and • Generally, an absolute change of >90% change in traffic is considered to be a high magnitude.
Medium	• Partial change or alteration to one or more key elements/ features of the baseline conditions; • Impact occurs over a medium scale/spatial extent and/ or has a medium-term duration; and • Generally, a 60% - 90% change in traffic is considered to be a medium magnitude.
Low	• Minor shift away from the baseline conditions; • Impact occurs over a local to medium scale/ spatial extent and/ or has a short to medium-term duration; and • Generally, a 30% - 60% change in traffic is considered to be a low magnitude.
Negligible	• Very slight change from baseline conditions; • Impact is highly localised and short term with full rapid recovery expected to result in very slight or imperceptible changes to baseline conditions or receptor population; and • Generally, a rule of <30% change in traffic is considered to be a negligible magnitude.

Effects

6.13.60 The evaluation of significance is determined through the identification of receptor sensitivity (Table 6.82), the method for defining sensitivity levels (Table 6.83), and magnitude of change (Table 6.84). Table 6.85 summarises how these categorisations will be combined. Significant effects are defined as 'moderate' or 'major' categories.

Table 6.85: Classification of effects (significance)

Magnitude	Sensitivity of Receptor			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

6.13.61 Note, the purpose of the T&T assessment, unlike a formal TA, is not to assess the operational capacity of the local road network (including junction capacities and associated modelling). Rather, it follows the IEMA Guidance

‘link-based’ approach to understanding traffic volumes and the potential impacts this has on the seven elements listed above. Junction capacities will be appraised as part of the TA which will form part of the Application.

Assumptions, Limitations and Uncertainties

- 6.13.62 At this stage, available information regarding the construction, operational and decommissioning phases of the Proposed Development are commensurate with the Application status. As is typical practice, a series of assumptions will therefore be made in the ES to be able to conduct a robust assessment of the likely impacts of the Proposed Development on T&T.
- 6.13.63 The assumptions used to inform the assessment will be based on good industry practice, site-specific evidence and data (where possible), and professional judgement and experience.

6.14 Water Environment

Overview

- 6.14.1 This section sets out the proposed scope and methodology for assessment of effects of the Proposed Development on the Water Environment. This has been informed by an overview of the environmental baseline conditions, along with the anticipated key issues likely to be associated with the Proposed Development.
- 6.14.2 This section should be read in conjunction with the description of the Proposed Development presented in Section 3: The Proposed Development of this EIA Scoping Report and is supported by the following figures (Appendix A):
- Figure 6.14.1: Hydrological Constraints WFD Waterbodies; and
 - Figure 16.4.2: Hydrological Constraints (Flood Risk).

Legislation, Policy and Guidance Context

- 6.14.3 The following legislation, policy and guidance will be considered in the ES:
- Environment Act (2021)²¹;
 - Levelling-up and Regeneration Act (2023)³⁶³;
 - Environmental Permitting (England and Wales) Regulations (EPR) (2016)²³;

³⁶³ UK Government (2023) Levelling-up and Regeneration Act 2023.

- Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations (2019)³⁶⁴;
- Environment (Amendment etc.) (EU Exit) Regulations (2019)³⁶⁵;
- Environmental Protection Act (1990)^{180 180};
- Environment Act (1995)²⁰;
- Water Resources Act (1991)¹⁸²¹⁸²¹⁸²;
- Water Industry Act (1991)³⁶⁶;
- Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) (WFD)²³¹²³¹;
- Land Drainage Act (1991)³⁶⁷;
- Water Act (2014)³⁶⁸;
- Water Resources (Abstraction and Impounding) Regulations (2006)³⁶⁹;
- Bathing Water (Amendment) Regulations (2018)³⁷⁰;
- Water Abstraction and Impounding (Exemptions) Regulations (2017)³⁷¹;
- Flood Risk Regulations (2009)³⁷²;
- Water Supply (Water Quality) Regulations (2018)³⁷³;
- Flood and Water Management Act (2010)³⁷⁴;
- Environmental Damage (Prevention and Remediation) Regulations (2015)¹⁸¹¹⁸¹;
- Water Framework Directive (Standards and Classification) Directions (2015)³⁷⁵;
- Groundwater (Water Framework Directive) Direction (2016)³⁷⁶;

³⁶⁴ UK Government (2019) The Environmental Permitting ((England and Wales) (Amended) (EU Exit) Regulations 2019.

³⁶⁵ UK Government (2019) The Environment (Amendment etc.) (EU Exit) Regulations 2019.

³⁶⁶ UK Government (1991) Water Industry Act 1991.

³⁶⁷ UK Government (1991) Land Drainage Act 1991.

³⁶⁸ UK Government (2014) Water Act 2014.

³⁶⁹ UK Government (2006) The Water Resources (Abstraction and Impounding) Regulations 2006.

³⁷⁰ UK Government (2018) The Bathing Water (Amendment) (England) Regulations 2018.

³⁷¹ UK Government (2017) The Water Abstraction and Impounding (Exemptions) Regulations 2017.

³⁷² UK Government (2009) The Flood Risk Regulations 2009.

³⁷³ UK Government (2016) The Water Supply (Water Quality) Regulations 2016.

³⁷⁴ UK Government (2010) Flood and Water Management Act 2010.

³⁷⁵ UK Government (2015) The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

³⁷⁶ Department for Environment, Food and Rural Affairs (2016) The Groundwater (Water Framework Directive) (England) Direction 2016. Available at: <https://assets.publishing.service.gov.uk/media/5a800055ed915d74e622be43/groundwater-ea-direction.pdf> [Accessed 22/01/2025].

- the Habitat Regulations (2017)^{83 84};
- Salmon and Freshwater Fisheries Act 1975 (as amended) (1975)³⁷⁷;
- The Overarching NPS for Energy (EN-1) (2024)²⁶
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (2024)²⁷;
- The PPG (2024)³⁵;
- Flood and Coastal Erosion Risk Management Policy Statement (2020)³⁷⁸;
- SBC Local Plan (2019)³⁰;
- Redcar and Cleveland Local Plan (2018)³¹;
- Environment Agency RBMP (2022)³⁷⁹;
- Environment Agency Flood Risk Management Plan (2022)³⁸⁰;
- Natural England Nutrient Neutrality Advice and Principles (2023)³⁸¹;
- Tees Valley Authorities – Local Standards for Sustainable Drainage (2019)³⁸²;
- RCBC Local Flood Risk Management Strategy (2017)³⁸³;

³⁷⁷ UK Government (1975) Salmon and Freshwater Fisheries Act 1975.

³⁷⁸ Environment Agency (2020) National Flood and Coastal Erosion Risk Management Strategy for England. Available at: <https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england--2> [Accessed 22/01/2025].

³⁷⁹ Environment Agency (2022) River basin management plans. Available at: <https://www.gov.uk/guidance/river-basin-management-plans-updated-2022> [Accessed 22/01/2025].

³⁸⁰ Environment Agency (2022) Flood risk management plans 2021 to 2027. Available at: <https://www.gov.uk/government/collections/flood-risk-management-plans-2021-to-2027> [Accessed 22/01/2025].

³⁸¹ Natural England (2023) Nutrient Neutrality Principles (TIN186). Available at: <https://publications.naturalengland.org.uk/publication/5031421117988864> [Accessed 22/01/2025].

³⁸² Tees Valley Authorities (2019) Tees Valley Sustainable Drainage Systems (SuDS) Guidance Design Guide & Local Standards. Available at: <https://www.hartlepool.gov.uk/downloads/file/2472/tees-valley-authorities-local-standards-for-sustainable-drainage> [Accessed 22/01/2025].

³⁸³ Redcar & Cleveland Borough Council (2017) Local Flood Risk Management Strategy. Available at: <https://www.redcar-cleveland.gov.uk/sites/default/files/2022-08/Flood%20Risk%20Strategy.pdf> [Accessed 22/01/2025].

- SBC Level 2 Strategic Flood Risk Assessment (SFRA) (2018)³⁸⁴; and
- Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive (2024)⁴⁰.

Consultation

- 6.14.4 Key consultees for the water environment assessment are the Environment Agency, local authorities, and the lead local flood authority (LLFA). To aid the preparation of this EIA Scoping Report, data requests were sent to the local authorities within a 3 km study area and to the Environment Agency to request information on PWS, abstractions, and water quality data.
- 6.14.5 Following receipt of the EIA Scoping Opinion, the responses from consultees will be reviewed and taken into consideration within the ES. If additional technical engagement is advised to confirm the scope of any elements of the assessment, this will be undertaken.

Baseline Conditions and Receptors

Study area

- 6.14.6 At the assessment stage, the water environment study area will be defined by the Proposed Development Site which will include the HPF and Hydrogen Pipeline(s). A 1 km buffer will be applied to the Proposed Development Site to create the ES study area. This 1 km study area will be extended to 3 km for the PWS desk-based assessment, to reflect that often the location of the source and associated infrastructure is not accurately recorded.
- 6.14.7 For direct effects on surface waters, the study area will include the geographical extent of the Proposed Development Site and all surface water features, including main rivers and their tributaries, ordinary watercourses, surface water abstractions and flood zones within 1 km, where features may have hydrological connectivity to the Proposed Development.
- 6.14.8 For groundwater, the study area will include the geographical extent of the Proposed Development Site and groundwater features which include underlying aquifers, SPZ, springs, groundwater abstractions and potential GWDTE within 1 km where features are likely to have hydrological connectivity to the Proposed Development.
- 6.14.9 Extension of the study area beyond the 1 km buffer may be considered to capture potential impacts to receptors beyond the selected study area. This

³⁸⁴ Stockton-on-Tees Borough Council (2018) Level 2 Strategic Flood Risk Assessment – Site Screening Available at: https://www.stockton.gov.uk/media/3008/Flood-risk-strategic-assessment-level-2/pdf/Flood_risk_-_strategic_assessment_level_2.pdf?m=1645808586627 [Accessed 22/01/2025].

may be important where the Proposed Development is likely to impact receptors upstream and downstream of the study area. A risk-based approach will be taken to the extension of the study area, based on assessment of impact pathways and this will be kept under review as understanding of interactions between sources-pathways-receptors evolves.

Sources of Information

6.14.10 The baseline describes the existing condition of surface water, groundwater and flood risk receptors within the study area. The following information sources have been used in the baseline assessment:

- Environment Agency Catchment Data Explorer¹⁹⁸;
- Northumbria RBMP³⁸⁵;
- OS mapping (including topography);
- BGS mapping¹⁰;
- Environment Agency flood risk mapping³⁸⁶;
- Environment Agency, 2021 Reservoir Flood Maps³⁸⁷;
- Environment Agency Spatial Flood Defences³⁸⁸;
- Local authority data requests for abstractions, discharges, and PWS;
- Environment Agency data request for abstractions, discharges, and PWS;
- Natural England designated sites view³⁸⁹; and
- project ecology survey data (Ecus, 2024, INCA, 2024, Arup 2024)³⁹⁰.

6.14.11 Key receptors are presented on Figure 6.14.1 (sheets 1 – 4).

³⁸⁵ Environment Agency (2022) Northumbria river basin district river management plan. Available at: <https://www.gov.uk/guidance/northumbria-river-basin-district-river-management-plan-updated-2022> [Accessed 22/01/2025]

³⁸⁶ Environment Agency (2022) Flood Risk Map Viewer. Available at: <https://check-long-term-flood-risk.service.gov.uk/map> [Accessed 22/01/2025]

³⁸⁷ Environment Agency (2021) Reservoir Flood Maps. Available at: <https://www.gov.uk/guidance/reservoir-flood-maps-when-and-how-to-use-them> [Accessed 22/01/2025]

³⁸⁸ Environment Agency (2022) Flood Map for Planning (Rivers and Sea) - Spatial Flood Defences (without standardised attributes). Available at: <https://www.data.gov.uk/dataset/76828b72-3c9c-4700-83c7-d7c36047d322/flood-map-for-planning-rivers-and-sea-spatial-flood-defences-without-standardised-attributes> [Accessed 22/01/2025].

³⁸⁹ Natural England (2024) Designated Sites View: Search for designated site details. Available at: <https://designatedsites.naturalengland.org.uk/> [Accessed 22/01/2025]

³⁹⁰ Arup (2023) H²NE Project Data: Phase 1 and UKHab survey data.

Existing Baseline

Designations

- 6.14.12 The Teesmouth and Cleveland Coast SPA, Ramsar, and SSSI is located within the study area and comprises a 1,200 ha complex of coastal habitats centred on the Tees estuary. Although not designated directly for water environment features, they are dependent on the quality of the water environment to function. Further details on the Teesmouth and Cleveland Coast SPA, Ramsar, and SSSI is included in Section 6.2: Biodiversity and Section 6.8: Marine Biodiversity.
- 6.14.13 As of March 2022, Natural England has identified that the Teesmouth and Cleveland Coast SPA is in an unfavourable condition due to nutrient pollution, specifically nitrogen. Development within the catchment that feeds the Teesmouth and Cleveland Coast SPA is required by Natural England to be 'nutrient neutral'.
- 6.14.14 There are no surface or groundwater DWPA within the study area.
- 6.14.15 There are no designated bathing waters within the study area, however a number of locations along the Teesmouth and Cleveland Coast may be hydrologically connected with the Proposed Development Site through watercourses and catchment drainage. The designated bathing waters downstream of the Proposed Development Site are:
- Seaton Carew North;
 - Seaton Carew Centre;
 - Seaton Carew North Gare;
 - Redcar Coatham;
 - Redcar Lifeboat Station;
 - Redcar Granville;
 - Redcar Stray; and
 - Marske Sands.
- 6.14.16 There are no shellfish protected waters within or downstream of the study area.

Surface Water

- 6.14.17 This section outlines the surface water receptors within the study area. These are shown in Figure 6.14.1 (Appendix A).

Watercourses

- 6.14.18 The River Tees (a Main River) discharges to the North Sea and is located 2.1 km south-east of the HPF Area. The Hydrogen Pipeline (east) will

require a crossing of the River Tees via an existing tunnel or alternatively via a new crossing below the bed of the River Tees. The River Tees is tidal with the normal tidal limit approximately 14 km upstream at the Tees Barrage.

- 6.14.19 Within a 1 km study area from the HPF Area, Holme Fleet, a Main River flows in a southerly direction before discharging to the River Tees and several other unnamed drains are present, including tributaries of Holme Fleet.
- 6.14.20 The HPF Area lies 700 m to the south-east of Greatham Creek, part of the Tees Estuary system. There are several named and unnamed watercourses within the study area that are present on OS mapping. In addition to those watercourses identified from OS mapping, there are several drainage channels, industrial drainage and settlement ponds, natural wetlands, and small tributaries throughout the study area.
- 6.14.21 A summary of watercourses within 1 km of the Hydrogen Pipeline(s) (representative of the eastern and western extents of the Proposed Development) are provided in Section 2, Table 2.4.

Water Framework Directive

- 6.14.22 The study area is located within the Northumbria River Basin District, and the Tees management catchment. There are three WFD surface waterbodies within the study area, detailed in Table 6.86.

Table 6.86: Water Framework Directive waterbodies

Waterbody	Location	2022 WFD Status
Tees Estuary (S bank) (GB103025072320)	Intersected by the Proposed Development Site (proposed discharge into Greatham Creek and Hydrogen Pipeline (east) at River Tees crossing). Lies generally to the north and east of the study area.	Bad
North Burn from Source to Claxton Beck (GB103025072540)	In north-west of the study area, 825 m from the Proposed Development Site.	Bad
Cowbridge Beck from Source to North Burn (GB103025072380)	In north-west of the study area, intersects the Proposed Development Site.	Moderate

Coastal Waters

- 6.14.23 The study area interacts with the Tees Estuary area, which is designated as a transitional waterbody with a Moderate WFD classification. Downstream of the study area is the Tees Coastal waterbody with a Moderate WFD classification.

Groundwater

- 6.14.24 This section outlines the groundwater receptors within the study area.

Geology

- 6.14.25 The study area is underlain by three bedrock types. Sherwood Sandstone Group in the west, Mercia Mudstone Group in the central area around the Tees and its estuary, and Redcar Mudstone Formation in the east of the study area. The bedrock is overlain by superficial deposits, comprising predominantly of tidal flat deposits of sand, silt and clay. There is a small area of glaciolacustrine deposits of clay and silt in the Cowpen Bewley area and the A1085. Devensian till is present in the eastern reaches of the study area.
- 6.14.26 The west of the study area, around Cowpen Bewley is underlain by a highly productive aquifer of Triassic rocks, this Principal (Sherwood Sandstone) aquifer is capable of producing up to 125 litres per second (L/s) of good quality groundwater (BGS, 2020)³⁹¹. The central portion of the study area around the Tees is underlain by a low productivity aquifer, and the east of the study area by Lias group rocks which hold essentially no groundwater.

Water Framework Directive

- 6.14.27 There are two WFD groundwater bodies within the study area. To the west of the Tees is the Tees Sherwood Sandstone waterbody (GB40301G702000), with a WFD classification of Good. To the east of the Tees is the Tees Mercia Mudstone & Redcar Mudstone waterbody (GB40302G701300), with a WFD classification of Poor.

Flood Risk

- 6.14.28 This section outlines the flood risk area within the study area from fluvial, coastal, pluvial, groundwater, and reservoir sources. These are shown in Figure 6.14.2 (Appendix A).

Fluvial and Coastal Flood Risk

- 6.14.29 Fluvial flooding is flooding that occurs from a river source; it occurs when the water levels in a river, lake, or stream rise and overflow onto neighbouring land. Coastal flooding is the result of coastal waters inundating dry and low-lying areas which are not usually found to be underwater. Due to the estuarine environment of the study area, and the Environment Agency's data, both flood risks are reported together.
- 6.14.30 The proposed HPF Area is outside of any flood risk zone from fluvial or coastal sources.
- 6.14.31 The north-west of the study area has small areas of flood risk associated

³⁹¹ British Geological Survey (2024) Hydrogeology 625K digital hydrogeological map of the UK. Available at: <https://www.bgs.ac.uk/datasets/hydrogeology-625k/> [Accessed 22/01/2025].

with the Cowbridge Beck as it flows through Cowpen Bewley Woodland Park. This extends to the roundabout between the A178 and A1185. The central section of the study area, west of the Tees, has large areas of flood risk associated with the estuarine environment. The wetlands have several pools and streams within them which flood as a mechanism of the habitat, in addition to inundation by tidal water.

6.14.32 There are some small areas along the margins of the River Tees, however the flood risk does not impact a large amount of land as the water is retained within the channel for the most part.

6.14.33 There are small areas associated with the Dabholm Cut in the north of the eastern side of the study area. Overall, the east of the study area has very little land impacted by fluvial or coastal flood risk.

Pluvial Flood Risk

6.14.34 Pluvial flooding occurs when extreme weather events create a flood independent of watercourses or waterbodies.

6.14.35 The proposed HPF Area has some areas of high pluvial flood risk around the existing CATS Terminal site infrastructure.

6.14.36 The west of the study area has small areas that are at risk from pluvial flooding. The east of the study area has more pronounced pluvial flood risk, with areas associated with existing hard standing within the Wilton International industrial complex. Natural topographic low points on either side of Ash Gill have also been identified as areas of high and medium pluvial flood risk.

Reservoir Flood Risk

6.14.37 Reservoir flood risk represents the areas where water may flow in the unlikely event of a dam or reservoir failure. The Environment Agency models two flooding scenarios - a 'dry-day'³⁹² and a 'wet-day'³⁹³. There are no reservoirs within the study area, however there are a number in the wider region which could be hydrologically connected to the study area in the event of a breach. The central portions of the study area are outside of reservoir flood risk, including the proposed HPF Area. Areas of Cowpen Bewley Woodland Park, Saltholme, Cowpen Marsh and Rough Marsh in the central areas of the study area are shown by modelling to be impacted in both wet and dry-day scenarios.

6.14.38 In the east of the study area, Lazenby and areas around Dabholm Cut and The Mill Race are shown by modelling to be impacted by the dry-day

³⁹² The 'dry-day' scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels

³⁹³ The 'wet day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme natural flood

scenario.

Sewer Flood Risk

- 6.14.39 There is some recorded sewer flooding at Greatham Beck from the Greatham sewage treatment works (STW) combined sewer overflow (CSO) Inlet³⁹⁴. In 2021, this was reportedly discharged for 33.7 hours.

Groundwater Flood Risk

- 6.14.40 The study area is largely within a low-lying estuary area, and as such the groundwater levels are anticipated to be near surface level. The Strategic Flood Risk Assessment (SRFA) for Redcar and Cleveland and Stockton-on-Tees identifies that although the overall area is unlikely to experience groundwater flooding, there are large pockets of permanently wet and waterlogged ground. This might be due the lower hydraulic conductivities of sandstone and mudstone and higher porosities so they cannot sustain the high flows necessary to cause flooding. The Environment Agency's 'Areas Susceptible to Groundwater Flooding' map³⁹⁵ is illustrated in the Redcar and Cleveland and Stockton-on-Tees reports and shows that the study area lies predominantly in an area considered to have a 75% or greater potential of groundwater emergence.
- 6.14.41 The Tees catchment flood management plan (CFMP) states that there is little documented evidence of groundwater flooding in the Tees catchment and groundwater flooding is not known to be a major problem due to the geology of the catchment. This is particularly true for areas where the main geology is sandstone and mudstone. However there is local evidence of subartesian conditions within the Sherwood Sandstone.
- 6.14.42 There has been some groundwater flood risk identified at the CATS Terminal site. This is as a response to long periods of rainfall, often after a period of seasonal wet weather. There are several mitigation options being considered for dealing with the identified groundwater flood risk, including operational measures, drainage interventions, possible raising of access routes and plants or upfilling of sites (refer to Section 6.6: Ground Conditions).

Flood defences

- 6.14.43 The Environment Agency is responsible for a number of flood defences within the study area, which they own, manage, and inspect. Flood defences are typically earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

³⁹⁴ FloodMapper (n.d) Greatham STW COS Inlet. Accessed at: <https://www.floodmapper.co.uk/stations/greatham-stw-cso-inlet-greatham> [Accessed 22/01/2025].

³⁹⁵ The Areas Susceptible to Groundwater Flooding map is divided into 1 km grid-squares in which a percentage is given for what proportion of the square is considered to be susceptible to groundwater emergence.

- 6.14.44 The west of the study area contains a number of flood defence assets, including a number of natural high ground features associated with watercourses or infrastructure features. Key flood defences in the area are associated with Greatham Creek, where the Environment Agency manage and maintain a number of measures such as embankments, realignments, and flood walls, as well as creating new areas of wetland habitat and enhancement. Proposals to upgrade Environment Agency maintained assets 52943/ Greenabella Marsh and 29171/ Brinefields are understood to currently be in development by the Environment Agency as part of the Greatham Creek FAS. Further information is provided in Section 5.2: Cumulative and Combined Effects.
- 6.14.45 Seal Sands Emergency Access Road High Ground runs parallel to the Proposed Development Site around the proposed for the HPF Area.

Private Water Supplies

- 6.14.46 There is one record of a private water supply within the study area, that is associated with Wilton International. This supply is a Regulation 8 Private Distribution System.

Abstractions

- 6.14.47 There are 31 licenced abstractions within the study area, six of which are within the Proposed Development Site. Readily available information was gathered on the abstraction records for groundwater sources (not including one surface water abstraction in Saltholme Reserve and one tidal water abstraction at Tees Dock). A summary of the abstractions within the study area are presented in Table 6.87 and indicative locations are presented in Figure 16.4.1 (Appendix A).

Table 6.87: Licensed abstractions within the study area

Abstraction licence number	Purpose	Source	Location
1/25/04/134	Environmental	Groundwater	Within the Proposed Development Site
1/25/04/134	Environmental	Groundwater	Within the Proposed Development Site
1/25/04/134	Environmental	Groundwater	130 m outside of Proposed Development Site
1/25/04/134	Environmental	Groundwater	75 m outside of the Proposed Development Site
1/25/04/134	Environmental	Groundwater	520 m outside of the Proposed Development Site
1/25/04/134	Environmental	Groundwater	315 m outside of the Proposed Development Site

Abstraction licence number	Purpose	Source	Location
1/25/04/134	Environmental	Groundwater	55 m outside of the Proposed Development Site
1/25/04/134	Industrial, Commercial And Public Services	Groundwater	Within the Proposed Development Site
1/25/04/134	Industrial, Commercial And Public Services	Groundwater	Within the Proposed Development Site
1/25/04/134	Industrial, Commercial And Public Services	Groundwater	130 m outside of the Proposed Development Site
1/25/04/134	Industrial, Commercial And Public Services	Groundwater	75 m outside of the Proposed Development Site
1/25/04/134	Industrial, Commercial And Public Services	Groundwater	520 m outside of the Proposed Development Site
1/25/04/134	Industrial, Commercial And Public Services	Groundwater	315 m outside of the Proposed Development Site
1/25/04/134	Industrial, Commercial And Public Services	Groundwater	55 m outside of the Proposed Development Site
1/25/04/134	Water Supply	Groundwater	Within the Proposed Development Site
1/25/04/134	Water Supply	Groundwater	Within the Proposed Development Site
1/25/04/134	Water Supply	Groundwater	130 m outside of the Proposed Development Site
1/25/04/134	Water Supply	Groundwater	75 m outside of the Proposed Development Site
1/25/04/134	Water Supply	Groundwater	520 m outside of the Proposed Development Site
1/25/04/134	Water Supply	Groundwater	315 m outside of the Proposed Development Site
1/25/04/134	Water Supply	Groundwater	55 m outside of the Proposed Development Site
1/25/04/142	Industrial, Commercial And Public Services	Groundwater	550 m outside of the Proposed Development Site
1/25/04/164	Environmental	Groundwater	735 m outside of the Proposed Development Site
1/25/04/183/R01	Industrial, Commercial And Public Services	Groundwater	820 m outside of the Proposed Development Site
1/25/04/183/R01	Industrial, Commercial And Public Services	Groundwater	820 m outside of the Proposed Development Site
NE/025/0001/011	Industrial, Commercial And Public Services	Tidal Water	945m outside of the Proposed Development Site
NE/025/0001/014	Industrial, Commercial And Public Services	Groundwater	825m outside of the Proposed Development Site

Abstraction licence number	Purpose	Source	Location
NE/025/0001/014	Industrial, Commercial And Public Services	Groundwater	825 m outside of the Proposed Development Site
NE/025/0001/014	Industrial, Commercial And Public Services	Groundwater	825 m outside of the Proposed Development Site
NE/025/0001/024	Industrial, Commercial And Public Services	Groundwater	40 m outside of the Proposed Development Site
NE/025/0001/008	Environmental	Surface Water	490 m outside of the Proposed Development Site

Discharges

6.14.48 There are around 200 licenced discharges within the study area that relate to several different types of industry. A summary of these discharges is presented in Table 6.88. The Environment Agency dataset is currently unclear on what type of waterbody the records discharge to.

Table 6.88: Summary of licensed discharges within the study area

Site Type	Number of records
Wastewater Treatment Works (WwTW) (not water co) (not STP at a private premises)	57
CSO on unadopted sewerage network (not water company)	7
Making of Chemicals + Chemical Products	30
WTW/Water Collection/Treatment/Supply	7
Undefined or Other	4
Making of Computers/Electronics/Optical Products	2
Making of Coke + Refined Petroleum Products	24
Making of Basic Metals/Iron + Steel/Foundry/Casting	6
Water Transport/Sea + Inland	1
Making of Basic Pharmaceutical Products + Preps	2
Real Estate Activities/Buying/Selling/Renting	3
WwTW/STW (water company)	46
Groundwater Remediation Sites/Civil Engineering	1
Waste Collection/Treatment/Disposal/Materials Recovery	1
Mineral/Gravel Extraction/Quarrying	1
Construction of Buildings	1
Mining Support Service Activities	1
Making of Textiles	1
Storm Tank/CSO on Sewerage Network (water company)	5

Ground Water Dependant Terrestrial Ecosystems

- 6.14.49 GWDTE are a category of wetlands which are ecologically dependent upon groundwater. They derive their water supply primarily from groundwater sources, rather than from precipitation and surface waters or land drainage.
- 6.14.50 The data available at scoping to understand the ecological habitats present across the Proposed Development Site has been recorded in UKHab. Although this is not as detailed as the standard for determining GWDTE presence (indicated by National Vegetation Classification (NVC) data), it does give an indication of where sensitive habitats and potential GWDTE may exist.
- 6.14.51 The UKHab surveys recorded areas of wet woodland in the centre of the Proposed Development Site, within the Seal Sands industrial areas, and aquatic marginal vegetation, within Saltholme Marsh and Seal Sands. These have the potential to be partially groundwater dependent. Based on the GWDTE Map of England, it is therefore assumed that these are GWDTE.

Future Baseline

- 6.14.52 No significant changes to current baseline conditions are predicted for the future baseline in the absence of the Proposed Development (e.g. waterbody size, WFD designation etc.)
- 6.14.53 Climate change is predicted to alter both tidal, fluvial and surface water flood risk and this will be considered in the FRA that accompanies the Application.

Potential Impacts

- 6.14.54 This section identifies potential impacts in relation to the construction, operation and decommissioning of the Proposed Development.

Construction

Hydrogen Production Facility

- 6.14.55 During construction within the HPF Area, potential impacts to the water environment include:
- Changes to surface water quantity: Changes to catchment dynamics and overland flow pathways due to construction activities and construction water management could impact on the quantity of surface water available for maintaining watercourses, habitats, and licenced abstractions. As a result, this has been **Scoped In** to the EIA.
 - Changes to surface water quality: There is the increased risk of pollution entering the watercourses from mobilised suspended solids and spillage of fuels or other harmful substances that may migrate to surface water

receptors. Construction water management may impact on water quality. As a result, this has been **Scoped In** to the EIA.

- Changes to hydromorphology of watercourses: In-channel works and works adjacent to watercourses have the potential to impact the hydromorphology of the watercourse during construction. As a result, this has been **Scoped In** to the EIA.
- Changes to groundwater quantity: Construction works may locally reduce the rate of recharge to aquifers where the runoff is managed and then discharged. This has the potential to reduce the flow available to springs and groundwater features. Construction activities may lead to a reduction or cessation of spring flow and baseflow supplying abstractions and potential GWDTE. Deep excavations or piling may result in permanent changes to the natural groundwater regime and modify the flow at springs, reduce yield from abstraction wells or reduce baseflow contribution to watercourses. As a result, this has been **Scoped In** to the EIA.
- Changes to groundwater quality: GI (including boreholes) and piling for foundations may create pathways to sensitive groundwater receptors and create new sources of pollution. As a result, this has been **Scoped In** to the EIA.
- Flood risk related impacts: Construction activities that increase the non-permeable area within the Proposed Development Site, such as construction compounds, have the potential to increase pluvial flood risk. Works within areas of flood risk are also at risk themselves. There is no fluvial flood risk within the Proposed Development Site for the HPF Area, however drainage infrastructure works may enter the floodplain. Given the likely high water table levels and waterlogged ground, groundwater flooding is a potential impact during construction activities within the HPF Area. As a result, this has been **Scoped In** to the EIA.

Hydrogen Pipeline(s)

6.14.56 During construction of the Hydrogen Pipeline(s), potential impacts to the water environment include:

- Changes to surface water quantity: Changes to catchment dynamics and overland flow pathways due to construction activities and construction water management could impact on the quantity of surface water available for maintaining watercourses, habitats, and licenced abstractions. As a result, this has been **Scoped In** to the EIA.
- Changes to surface water quality: There is the increased risk of pollution entering the watercourses from mobilised suspended solids and spillage of fuels or other harmful substances that may migrate to surface water receptors. Construction water management may impact on water quality. As a result, this has been **Scoped In** to the EIA.
- Changes to hydromorphology of watercourses: In channel works and works adjacent to watercourses have the potential to impact the

hydromorphology of the watercourse during construction, this includes temporary watercourse crossings and open cut crossings for the supply pipes. As a result, this has been **Scoped In** to the EIA.

- Changes to groundwater quantity: Construction works may locally reduce the rate of recharge to aquifers where the runoff is managed and then discharged. This has the potential to reduce the flow available to springs and groundwater features. Construction activities such as pipeline trenching may lead to a reduction or cessation of spring flow and baseflow supplying abstractions and potential GWDTE. Deep excavations or piling may result in permanent changes to the natural groundwater regime and modify the flow at springs, reduce yield from abstraction wells or reduce baseflow contribution to watercourses. As a result, this has been **Scoped In** to the EIA.
- Changes to groundwater quality: HDD and trenching may create pathways to sensitive groundwater receptors and create new sources of pollution to enter the groundwater environment. As a result, this has been **Scoped In** to the EIA.
- Flood risk related impacts: Construction activities that increase the non-permeable area within the Proposed Development Site, such as construction compounds, have the potential to increase pluvial flood risk. Works within areas of flood risk are also at risk themselves. There are substantial areas of fluvial flood risk within the Proposed Development Site which may be at risk of flood related impacts. Groundwater flooding is unlikely for the eastern areas of the Proposed Development Site but may be an issue in the west due to the aquifer in this area being highly productive. As a result, this has been **Scoped In** to the EIA.

Operation

Hydrogen Production Facility

6.14.57 During operation of the HPF, potential impacts to the water environment could arise from:

- Changes to surface water quantity: Changes to catchment dynamics and overland flow pathways due to foundations and drainage for the HPF may impact on the quantity of surface water available for maintaining watercourses, habitats, and licenced abstractions. As a result, this has been **Scoped In** to the EIA.
- Changes to surface water quality: There is the operational risk of pollution entering the watercourses from spillage of fuels or other harmful substances used within the operation of the facility that may migrate to surface water receptors. Surface water drainage discharge may impact on water quality. Effluent from the production of hydrogen will be disposed of to a local wastewater treatment facility and will not be treated and discharged within the Proposed Development Site. There is proposed discharge of grey water from site drainage network to Greatham Creek which could impact surface water quality. A nutrient

neutrality assessment will be undertaken as part of the HRA to evaluate impacts and any LSEs on water quality. As a result, this has been **Scoped In** to the EIA.

- Changes to hydromorphology of watercourses: Permanent infrastructure within and adjacent to watercourses, such as outfall pipes or access crossings may change the hydromorphology of a watercourse. As a result, this has been **Scoped In** to the EIA.
- Flood risk related impacts: Permanent increase in the non-permeable area within the Proposed Development Site, such as foundations for the HPF, have the potential to increase pluvial flood risk downstream. Additionally, modifications to ground levels and vegetation clearance works may augment the possibility of surface water flooding. There is no fluvial flood risk within the Proposed Development Site for the HPF, however the drainage infrastructure may interact with the floodplain. Given the likely high water table levels and waterlogged ground, groundwater flooding is a potential impact during construction working within the HPF Area. As a result, this has been **Scoped In** to the EIA.

Hydrogen Pipeline(s)

6.14.58 During operation of the Hydrogen Pipeline(s), potential impacts to the water environment could arise from:

- Surface water drainage from any permanent infrastructure e.g. AGI - discharge may impact on water quality. As a result, this has been **Scoped In** to the EIA.
- Changes to hydromorphology of watercourses: Permanent infrastructure within and adjacent to watercourses such as watercourse crossings may change the hydromorphology of a watercourse. As a result, this has been **Scoped In** to the EIA.
- Changes to groundwater quantity: Excavations associated with the Hydrogen Pipeline and any HDD/ MBT crossings may result in permanent changes to the natural groundwater regime and modify the flow at springs, reduce yield from abstraction wells or reduce baseflow contribution to watercourses. As a result, this has been **Scoped In** to the EIA.
- Changes to groundwater quality: There is no direct pathway between the activities involved in the Hydrogen Pipeline and River Tees crossing using HDD/ MBT operations and groundwater receptors during the operational phase. Therefore, changes to groundwater quality have been **Scoped Out**.
- Flood risk related impacts: Permanent increase in the non-permeable area required to support above ground sections of the Hydrogen Pipeline(s), have the potential to increase pluvial flood risk. Additionally, modifications to ground levels and vegetation clearance works may augment the possibility of pluvial flooding. Any permanent infrastructure above ground or permanent watercourse crossings may restrict flow or

create blockages and change fluvial flood risk downstream. As a result, this has been **Scoped In** to the EIA, although during operation, groundwater flooding is not considered to be an impact for the Hydrogen Pipeline and as a result, this has been **Scoped Out** of the EIA.

Decommissioning

Hydrogen Production Facility and Hydrogen Pipeline(s)

- 6.14.59 During decommissioning of the Hydrogen Pipeline(s), it is assumed that above ground infrastructure will be removed and in ground infrastructure will be left in situ. Therefore, the impacts during the decommissioning are considered comparable with, or likely less than, those of the construction stage. As a result, this has been **Scoped In** to the EIA.

Embedded Mitigation

- 6.14.60 Mitigation measures will be considered throughout the design process of the Proposed Development. These measures will be included with the objective to reduce the potential for impacts upon the water environment. Where the assessment identifies that an aspect of the Proposed Development is likely to give rise to significant environmental effects, secondary mitigation measures, above and beyond any embedded mitigation or design changes, will be incorporated into the assessment process to avoid or reduce significant effects. These will be further outlined within the ES chapter.

Construction

- 6.14.61 A Framework CEMP will be produced to accompany the Application and secured via a requirement of the draft DCO. The Final CEMP would be produced by the appointed contractors in accordance with the Framework CEMP and be implemented to avoid, minimise or mitigate effects on the water environment during the construction phase of the Proposed Development.
- 6.14.62 Standard measures to be included in the CEMP will be based on the Environment Agency's Pollution Prevention Guidelines (PPG) (which are currently being reviewed and replaced where advised), the relevant Construction Industry Research and Information Association (CIRIA) publications and best practice measures outlined its replacement series, guidance for pollution prevention (GPP).
- 6.14.63 Examples of standard practice mitigation measures that will be included in the CEMP include the provision of spill kits, locating machinery cleaning stations away from watercourses, and restricting concrete mixing to at least 10 m away from watercourses.

6.14.64 Subject to the assessments provided in the ES, the Framework CEMP may also include:

- A surface water management system using measures such as temporary silt fencing, cut off ditches, settlement ponds and bunds set up early in the construction period to capture runoff and prevent ingress of sediments and contaminants into existing drainage ditches where advised.
- The water management system in accordance with CIRIA Guidelines and Environment Agency approach to groundwater protection and groundwater protection guidelines³⁹⁶.
- Water with a higher risk of contamination which requires discharge, including groundwater pumped out of piles during concrete pouring, would be contained and treated using appropriate measures such as coagulation of sediments, dewatering and pH neutralisation prior to discharge.
- Contaminated water that cannot be treated on site would, if advised, be pumped to a suitably licenced tanker before being exported off site for treatment at an appropriately permitted facility.
- A Flood Warning and Evacuation Plan will be developed where works are within areas potentially affected by flooding. This will set out the potential risks and identify a procedure for receiving and acting on flood warnings or for monitoring conditions on site to assist in the awareness of potential risks for site operatives how to mitigate them through safe working practices.
- Works in the floodplain would be suspended during out-of-bank river flows, coastal water inundation or during intense rainstorms.
- A suitable strategy will be developed for managing any temporary impacts on floodplain storage or conveyance which may include identifying specific areas outside the floodplain for storage of materials or providing compensatory storage on a temporary basis.
- Water use efficiency measures will be adopted where applicable, for example rainwater harvesting and grey water re-use for wheel washing and dust suppression.
- Consideration of local groundwater catchment and flow regimes that may be affected by dewatering design and discharging the abstracted water to the same groundwater catchment and down gradient of the dewatered element.

6.14.65 The Final CEMP would also set out the requirements for monitoring the effectiveness of mitigation measures to reduce pollution or flood risk

³⁹⁶ Environment Agency (2017) Protect groundwater and prevent groundwater pollution. Available at: <https://www.gov.uk/government/publications/protect-groundwater-and-prevent-groundwater-pollution> [Accessed 22/01/2025].

impacts.

Operation

- 6.14.66 Any infrastructure impacting the floodplain and areas of high and medium flood risk will be accompanied by a suitable floodplain compensation strategy to include measures to manage the impacts of loss of floodplain storage or conveyance.
- 6.14.67 Watercourse crossings will be minimised where possible within the Hydrogen Pipeline design. Any infrastructure within or alongside watercourses will be designed to reduce the potential for significant detrimental impact on flow conveyance and localised or catchment-wide impacts on flood risk; this will include any watercourse diversions, or any culverting advised as a result of the permanent works.
- 6.14.68 Any permanent watercourse diversions or crossings will be designed to assist in continuity of conveyance and floodplain utilisation such that there is no residual significant detrimental impact on the wider catchment.
- 6.14.69 Sensitive habitats such as wetlands and potential GWDTE, and existing abstractions will be considered and where reasonably practicable, avoided, within the Hydrogen Pipeline design.

Decommissioning

- 6.14.70 A DEMP will be produced prior to decommissioning and will likely include similar measures as included within the CEMP. The final DEMP would be secured via requirement of the draft DCO.

Summary of Potential Likely Significant Effects

- 6.14.71 Table 6.89 summarises the potential impacts from the construction, operation and decommissioning of the Proposed Development which are relevant to the Water Environment assessment and are **Scoped In** or **Scoped Out** of the EIA.

Table 6.89: Water environment elements scoped in or out of future environmental impact assessment

Element	Phase	Scoped In	Scoped Out	Justification
Hydrogen Production Facility and Hydrogen Pipeline				
Changes to surface water quantity	Construction and Operation and Decommissioning	✓		Likelihood for non-significant effects.
Changes to surface water quality	Construction and Operation and Decommissioning	✓		Likelihood for non-significant effects.
Changes to hydromorphology of watercourses	Construction and Operation and Decommissioning	✓		Likelihood for non-significant effects.
Changes to groundwater quantity	Construction and Operation and Decommissioning	✓		Likelihood for non-significant effects.
Changes to groundwater quality	Construction and decommissioning	✓		Likelihood for non-significant effects.
Changes to groundwater quality	Operation		✓	There is no direct pathway between the activities involved in the Hydrogen Pipeline and Tees Crossing once constructed, using HDD/MBT operations and groundwater receptors during the operational phase. Therefore, changes to groundwater quality have been Scoped Out .
Flood risk related impacts	Construction and Operation and Decommissioning	✓	✓	Likelihood for non-significant effects. During operation, groundwater flooding is not considered to be an impact for the Hydrogen Pipeline and as a result, this has been Scoped Out of the EIA.

Proposed Assessment Methodology

6.14.72 This section outlines the proposed methodology for the water environment assessment within the ES, including the proposed study area, desk-based assessment, field surveys and the assessment methodology including a significance matrix.

Baseline Data Collection

Desk-Based Assessment

- 6.14.73 A desk-based study will be completed using publicly available data and data received from stakeholders through consultation. The desk study will identify potential water receptors and sensitive areas within the study area, which may include groundwater and surface water dependant features, PWS and locations of watercourse crossings that cannot be avoided. This will generate an understanding of the baseline conditions within the study area, and any key sensitivities and receptors.
- 6.14.74 A review of PWS based on data provided by local authorities will be completed for a 3 km study area. A nutrient neutrality assessment will be undertaken as part of the HRA to evaluate impacts on water quality. Potential GWDTE will be identified following identification of relevant habitats from the ecology baseline data being gathered for the ES.

Site Surveys

- 6.14.75 Site surveys will be conducted to ground-truth and expand on the data received during the desk study and to gain an understanding of the existing topography, hydrological and hydrogeological conditions of the study area. Additionally, the surveys will include collection of data at the proposed watercourse crossing locations to inform design and construction methods.

Assessment Criteria

- 6.14.76 The water environment assessment within the ES will follow the methodology outlined in Section 5.1 of this EIA Scoping Report for the characterisation of the existing environment.
- 6.14.77 A qualitative assessment methodology will be used to assess the magnitude of the potential impacts, using guidance from the Environment Agency and Natural England and the DMRB documentation LA113²⁰⁶²⁰⁶ and LA104¹⁸⁵. The assessment of effects will consider environmental impacts of the construction, operation and decommissioning phases of the Proposed Development as well as the environmental impacts in the absence of the Proposed Development (the do-nothing scenario).
- 6.14.78 Impact magnitude and receptor sensitivity are defined within DMRB LA103³⁹⁷ as importance and presented in Table 3.2N and Table 3.4N. They interact to facilitate a judgement of likely significance of effects, using

³⁹⁷ Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (2020) Design Manual for Roads and Bridges: LA 103 Scoping projects for environmental assessment. Available at: <https://www.standardsforhighways.co.uk/tses/attachments/fb43a062-65ad-48d3-8c06-374cfd3b8c23?inline=true> [Accessed 22/01/2025].

professional judgement and the matrix that has been replicated and presented in Table 6.90.

- 6.14.79 The significance of the potential effects will be defined by considering the sensitivity of the receptors and the magnitude of potential impacts that may occur. Effects that are moderate or above are considered to be significant in EIA terms, as shown in bold in Table 6.90.
- 6.14.80 The assessment will follow a source-pathway-receptor approach, where all three are required to exist for an effect to be present.
- 6.14.81 The assessment will take into consideration embedded mitigation, including the Framework CEMP that will be developed for the Proposed Development. The assessment of potential effects will consider the 'worst-case' scenarios, i.e. one that is precautionary, but it is reasonable to assume could occur, rather than an extreme scenario that is unlikely, and mitigation measures will be included within the project design for the preliminary assessment accordingly.
- 6.14.82 An Outline Drainage Strategy will be presented as a technical appendix of the ES.

Table 6.90: Interaction Between Impact Magnitude and Receptor Sensitivity to Assign Significance

		Magnitude of Impact				
		No change	Negligible	Minor	Moderate	Major
Sensitivity of Receptor	Very High	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Sight 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

Assumptions, Limitations and Uncertainties

- 6.14.83 No site survey for the water environment chapter has been carried out to inform this scoping chapter; baseline information on the water environment has been established from publicly accessible desk-based sources.

- 6.14.84 This preliminary assessment has used available design information. Where design information is unknown or unavailable, conservative or worst case assumptions have been made. This will also be the approach used in the ES.
- 6.14.85 Information on habitats of ecological value has used ecology survey data completed to support the design development of the Proposed Development. For limitations and assumptions regarding the habitat identification surveys refer to Section 6.2: Biodiversity.
- 6.14.86 The data available at scoping to understand the ecological habitats present across the Proposed Development Site has been recorded in UKHab. This is not as detailed as the standard for determining GWDTE presence, however it does give an indication of where sensitive habitats and potential GWDTE may exist.

7 Matters to be Scoped Out

7.1 Human Health

Overview

7.1.1 This Section sets out the proposed scope and methodology for assessment of effects of the Proposed Development on Human Health. This has been informed by an overview of the environmental baseline conditions, along with the likely impacts of the Proposed Development on environmental, social and economic determinants of health.

7.1.2 This Section should be read in conjunction with, and draws upon, the following sections of this EIA Scoping Report:

- Section 3: The Proposed Development;
- Section 6.1: Air quality;
- Section 6.6: Ground conditions;
- Section 6.7: Landscape and visual;
- Section 6.11: Noise and vibration;
- Section 6.12: Socio-economics;
- Section 6.13: Traffic and transport; and
- Section 6.14: Water environment.

Legislation, Policy and Guidance Context

7.1.3 The following legislation, policy and guidance has been considered:

- The Overarching NPS for Energy (EN-1) (2024)²⁶;
- The NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (2024)³²;
- The NPS for Natural Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2024)³³;
- The NPS for Electricity Networks Infrastructure (EN-5) (2024)³⁴;
- The NPPF (Section 8 'Promoting healthy and safe communities') (2024)²⁷;
- SBC Local Plan (2019)³⁰;
 - Strategic Priority 6
 - Strategic Priority 10
- Redcar and Cleveland Local Plan (2018)³¹;

- Policy SD 4 (General Development Principles)
- IEMA Guide to Effective Scoping of Human Health in Environmental Impact Assessment (2022)³⁹⁸;
- IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (2022)³⁹⁹;
- Public Health England (PHE) (now UK Health Security Agency): Advice on the content of Environmental Statements accompanying an application under the Nationally Significant Infrastructure Planning Regime⁴⁰⁰ (2021);
- Public Health England Strategy 2020-2025⁴⁰¹ (2019); and
- Spatial Planning for Health: An Evidence Resource for Designing Healthier Places (2017).⁴⁰²

Baseline Conditions and Receptors

Study area

7.1.4 The study area is defined by the following:

- the local population, defined as the population within the LSOA that fall within 300 m⁴⁰³ of the Proposed Development Site; and
- the wider population who may experience indirect social and economic effects, defined as the population of Stockton-on-Tees and Redcar and Cleveland.

Existing Baseline

7.1.5 An initial desk-based baseline assessment has been undertaken to gather

³⁹⁸ Institute of Environmental Management (2022) Effective Scoping of Human Health in Environmental Assessment. Available at: <https://www.iema.net/media/s35fughe/iema-eia-guide-to-effective-scoping-of-human-health-nov-2022.pdf> [Accessed 22/01/2025].

³⁹⁹ Institute of Environmental Management (2022) Determining Significance for Human Health in Environmental Impact Assessment. Available at: <https://www.iema.net/media/yjlb2nbs/iema-eia-guide-to-determining-significance-for-human-health-nov-2022.pdf> [Accessed 22/01/2025].

⁴⁰⁰ Public Health England (2021) Advice on the content of Environmental Statements accompanying an application under the NSIP regime. Available at: <https://khub.net/documents/135939561/390856715/Advice+on+the+content+of+environmental+statements+accompanying+an+application+under+the+Nationally+Significant+Infrastructure+Planning+Regime.pdf/a86b5521-46cc-98e4-4cad-f81a6c58f2e2?t=1615998516658> [Accessed 22/01/2025].

⁴⁰¹ Public Health England (2019) PHE Strategy 2020-2025. Available at: https://assets.publishing.service.gov.uk/media/5d7b72c8ed915d5257b5b66c/PHE_Strategy_2020-25.pdf [Accessed 22/01/2025].

⁴⁰² Public Health England (2017) Spatial Planning for Health: An Evidence Resource for Designing Healthier Places. Available at: https://assets.publishing.service.gov.uk/media/5b59b090e5274a3ff828c70c/spatial_planning_for_health.pdf [Accessed 22/01/2025].

⁴⁰³ A 300 m radius has been selected as this is considered to be the distance over which direct health effects are likely to occur. This is aligned with other environmental topics that influence health, such as noise.

existing information relating to human health to define the study area. Baseline information⁴⁰⁴ has been obtained from the following sources:

- PHE Health Profiles for Stockton on Tees⁴⁰⁵ and Redcar and Cleveland⁴⁰⁶; and
- Index of multiple deprivation (IMD) 2019⁴⁰⁷.

7.1.6 PHE produces data at the local authority level and publishes health profiles. These profiles provide a snapshot of public health in an area and help local government and health service providers to understand local community health needs and priorities.

7.1.7 Table 7.1 shows health and wellbeing indicators for the local authorities in which the Proposed Development is located, compared to the regional and national averages.

Table 7.1: Borough-level health and wellbeing indicators

	'Very good' or 'Good' self-rated general health (%) ⁴⁰⁸	'Bad' or 'Very bad' self-rated general health (%)	Income deprivation score	Life expectancy (male/years)	Life expectancy (female/years)
Stockton on Tees	80%	6%	0.164	77.7	81.2
Redcar and Cleveland	77%	8%	0.186	76.8	81.0
County Durham	77%	8%	0.165	77.2	80.4
England	82%	5%	0.116	78.9	82.8

7.1.8 The IMD 2019 measures relative levels of deprivation at the geographical scale of LSOA. The IMD is made up of seven 'domains' of deprivation, which collectively provide an overall indicator of deprivation. The domains considered in this scoping assessment are:

- employment;
- health and disability; and
- living environment.

⁴⁰⁴ IMD 2019 represents the most recent deprivation data collected.

⁴⁰⁵ Public Health England (2019) Stockton-on-Tees Local Authority Health Profile. Available at: <https://fingertips.phe.org.uk/static-reports/health-profiles/2019/E06000004.html?area-name=Stockton-on-Tees> [Accessed 22/01/2025].

⁴⁰⁶ Public Health England (2019) Redcar-and-Cleveland Local Authority Health Profile. Available from: <https://fingertips.phe.org.uk/static-reports/health-profiles/2019/e06000003.html?area-name=redcar%20and%20cleveland> [Accessed 22/01/2025].

⁴⁰⁷ Office for National Statistics (2019) Indices of Multiple Deprivation. Available at: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019> [Accessed 22/01/2025].

⁴⁰⁸ Office for National Statistics (2021) Census, Dataset TS037 – General Health. Available at: <https://www.nomisweb.co.uk/datasets/c2021ts037> [Accessed 22/01/2025].

- 7.1.9 Relative levels of deprivation are ranked from 1 to 10, where 1 refers to the most deprived decile (the 10% most deprived), and 10 refers to the least deprived decile (the 10% least deprived). The IMD levels of deprivation within the study area are summarised in Table 7.2 below.

Table 7.2: Deprivation rankings of Lower Super Output Areas in the study area

LSOA (refer to Figure 6.11.2 in Appendix A)	Overall deprivation	Employment	Health and disability	Living environment
Within the Proposed Development Site				
Stockton-on-Tees 003E (E01012216)	2	2	1	10
Stockton-on-Tees 003B (E01012198)	1	1	1	10
Redcar & Cleveland 003D (E01012107)	1	1	1	10
Redcar & Cleveland 003E (E01032660)	5	5	4	10
West of the Proposed Development Site - Hartlepool				
Stockton-on-Tees 003F (E01012245)	1	1	1	10
Hartlepool 014D (E01011968)	5	4	4	9
Hartlepool 011D (E01011998)	7	4	2	10
East of the Proposed Development Site – Redcar & Cleveland				
Redcar & Cleveland 003F (E01032561)	1	1	1	10
Redcar & Cleveland 011B (E01012109)	3	3	1	10

- 7.1.10 The Proposed Development is located in an area of high social deprivation. When compared with the national averages, self-rated general health is worse, life expectancy is lower, and income deprivation is higher.
- 7.1.11 The LSOA that fall within the Proposed Development Site boundary experience higher levels of overall deprivation when compared to the national average and are predominantly within the 20% most deprived LSOA. The exception is Redcar & Cleveland 003E, which is around the national average. Deprivation related to employment and health and disability is notably high. Deprivation related to living environment (which refers to quality of housing, air pollution and traffic accidents) is low across all LSOA.
- 7.1.12 The LSOA in the surrounding area generally experience less deprivation

when compared to the area encompassing the Proposed Development Site boundary, although Stockton-on-Tees 003F and Redcar & Cleveland 003F fall within the most deprived decile overall. Similarly, employment and health and disability deprivation are higher than the national average and living environment related deprivation is very low.

Future Baseline

- 7.1.13 The ONS population projections are summarised in Table 7.3 below. Between 2023 and 2043 the proportion of the population in the study area aged over 65 is projected to increase from 21% (in 2023) to 26%, slightly higher than the regional and national proportions in this age group. Correspondingly, the proportion of the population aged 64 and under is projected to decrease, with the largest decrease in the working age population (15-64) which is predicted to decrease four percentage points to 58%. However, there are currently a number of large schemes in progress contributing to the industrial regeneration of the wider Teesside area (e.g. NZT, H2Teesside), which may impact population projections.

Table 7.3: Population projection

Area	2023 estimate	2033 projection	2043 projection
Study area (Stockton-on-Tees, Redcar & Cleveland, Hartlepool local authorities*)			
0-14	17%	16%	16%
15-64	62%	59%	58%
65+	21%	25%	26%
North-East			
0-14	16%	15%	15%
15-64	63%	60%	60%
65+	21%	25%	25%
England			
0-14	15%	16%	16%
15-64	64%	62%	60%
65+	19%	22%	24%

*lowest order data available

Potential Impacts

- 7.1.14 This section identifies potential impacts in relation to the construction and operation of the Proposed Development. The HPF and Hydrogen Pipeline(s) are considered together. However, as the Hydrogen Pipeline is assumed to be largely below-ground, where a potential impact relates to the

operation of the HPF, only the nearest sensitive receptor to the HPF is considered and this is noted in the assessment. Construction, operational and decommissioning impacts are considered separately.

- 7.1.15 This assessment uses a broad definition of health, defined by the WHO as “*a state of complete physical, mental and social wellbeing and not merely an absence of disease or infirmity.*” The assessment is based on the ‘wider determinants of health’ model, which recognises that health is influenced by a range of social, economic and environmental factors known as health determinants, such as access to health and education services, availability of training and employment opportunities and the quality of the built and natural environment.
- 7.1.16 As stated in the IEMA Guide to Determining Significance³⁹⁹, the consensus in literature and among public health practitioners and impact assessors is that a ‘population health’ approach may be taken when assessing health effects in EIA. Population health refers to the health outcomes of a group of individuals, including the distribution of such outcomes within the group. Health assessment considers effects on the general population and, where relevant, groups with specific vulnerabilities, such as children, older people, people with existing health conditions, those on low incomes and/ or living in areas with high levels of social deprivation. Effects on individuals are not considered to lead to potential health effects in the context of this assessment.
- 7.1.17 The IEMA Guide to Effective Scoping of Human Health in Environmental Impact Assessment³⁹⁸ recommends the inclusion of a health chapter within the EIA where “*wider determinants of health not covered by other EIA technical topics have been scoped in*” or where other topics have been scoped to assess potential effects to human and community receptors and there are likely and potentially significant population health implications from such assessments.” The IEMA Guide to Effective Scoping of Human Health in Environmental Impact Assessment goes on to state that: “*Where other EIA technical topics do not have likely and potentially significant population health implications this should be explained with a concise justification within the EIA Scoping Report health section.*”
- 7.1.18 The PHE Advice on the content of ES (‘the PHE Advice’) provides guidance on what aspects may be considered in the assessment of potential effects on human health in EIA for NSIP projects. Table 7.4 summarises how each aspect described in the PHE Advice will be considered in the EIA for the Proposed Development. For all aspects where there is a potential effect on human receptors, a reference is given to where potential significant effects on population health are considered.

Table 7.4: Application of PHE Advice⁴⁰⁰ to the EIA

Determinant of health (PHE Advice)	Effect on human receptors ? (Y/N)	Consideration of potentially significant effects on population health (with reference to relevant section(s) of this EIA Scoping Report)
Environmental health		
Emissions to air	Y	Refer paragraphs 7.1.19 (construction) and 7.1.28 (operation).
Emissions to water	Y	As above
Land quality	Y	As above
Waste	N	The waste assessment will consider the waste hierarchy, and impacts mitigated in line with best practice techniques through measures secured in the SWMP, Environmental Permit and EMS, and DEMP (Refer to Section 6.9: Material Assets and Wastes). Due to the waste management procedures set out in Section 6.9, there are no potential effects on human receptors resulting from construction and operational waste and therefore no effect on population health.
Accidents and COMAH	N	Accidents/ COMAH and relevant health and safety legislation will be considered within the major accidents and disasters chapter of the ES (refer Section 6.10: Major Accidents and Disasters). The assessment of accidents is a risk assessment, dealing with potential major incidents with serious consequences but a low chance of occurrence. It is considered that, with risk assessment and mitigation, and adherence to industry standards, there are no LSE on human receptors and therefore no effect on population health.
Electric and magnetic fields and ionising radiation	N	No significant sources of electro-magnetic radiation would be introduced as a result of the Proposed Development and therefore this topic is not scoped into the EIA.
Noise	Y	Refer paragraphs 7.1.19 (construction) and 7.1.28 (operation).
Wider determinants of health		
Access (including physical activity and open space)	Y	Refer paragraphs 7.1.23 (construction) and 7.1.30 (operation).
Traffic and transport (including accessibility and public transport)	Y	Refer paragraphs 7.1.24 (construction) and 7.1.31 (operation).
Socio-economic	Y	Refer paragraphs 7.1.25 - 7.1.27 (construction) and 7.1.34 - 7.1.37 (operation).

Determinant of health (PHE Advice)	Effect on human receptors ? (Y/N)	Consideration of potentially significant effects on population health (with reference to relevant section(s) of this EIA Scoping Report)
(including employment and communities)		
Land use	Y	Refer paragraphs 7.1.23 (construction) and 7.1.30 (operation).

Construction

Environmental impacts

7.1.19 The following potential impacts on environmental determinants of health have been considered in this EIA Scoping Report:

- Noise and vibration (Section 6.11): There is a potential for noise and vibration impacts from construction activities and construction traffic. The Proposed Development Site is generally remote from residential receptors. The closest residential receptors are described in Section 2.4 of Section 3: The Site and Surrounding Area and include Marsh House Farm (2.1 km north-west of the HPF Area). Residential receptors are located closer to the Hydrogen Pipeline (west) and Hydrogen Pipeline (east) as described in Section 3. Communities along the construction traffic routes may experience noise and vibration from construction traffic. Noise impacts will be localised, affecting individual sensitive receptors within 50 m of affected roads (as defined in Section 6.11: Noise and Vibration). The assessment criteria used in the noise assessment will take account of human responses to different types and levels of noise. No changes to noise exposure at the community level are expected and therefore no potential effects on population health are identified.
- Air quality (Section 6.1): The air quality assessment considers the effects of the Proposed Development on pollutants linked to human health outcomes. Potential emissions from construction activities and construction traffic have the potential to affect air quality, which will be assessed in the EIA. The air quality assessment will consider the potential effects as a result of increased exposure to pollutants at individual receptors. Health outcomes will be taken into account in the significance criteria used in the air quality assessment, with sensitive human health receptors identified in the baseline. Due to the small number of sensitive receptors in proximity to the Proposed Development Site and the A-roads serving the Proposed Development Site, no overall change in exposure to air pollution is expected at the population level and therefore there are no potential effects on population health. Effective site-specific mitigation measures will be implemented via the CEMP secured via the draft DCO, to minimise any likely significant

adverse environmental effects on individual sensitive receptors. A Framework CEMP will accompany the Application.

- Visual impacts (Section 6.7): The Proposed Development Site is located in a heavily industrialised area and therefore visual impacts from construction activities (e.g. presence of tall cranes) within the HPF Area are unlikely to result in decreased visual amenity but will be assessed and reported in the Landscape and Visual Amenity section.
- Surface, ground water and soil contamination (Section 6.6 and 6.14): Sensitive human health receptors will be identified in the contamination assessment baseline. The significance criteria used in this assessment take account of human health responses to contamination and mitigation measures will be provided to assist in compliance with regulations to protect health. The legal framework for the protection of water quality and the embedded mitigation to be included to assist in compliance are set out in Section 6.14. As a result of the embedded design and control measures secured via the CEMP, no potential adverse effects on human health are identified.

7.1.20 Consideration of human health and wellbeing is integral to these environmental assessments. While some topics have identified the potential for environmental effects on individual sensitive receptors, the likely scale of effects, taking into account embedded mitigation, is not considered likely to result in potentially significant effects on health outcomes at the population level. Therefore, health effects arising from impacts on environmental determinants of health are proposed to be **Scoped Out**.

7.1.21 Combined environmental impacts, such as noise and visual impacts, have the potential to change local amenity, affecting people's attachment to and enjoyment of their local environment, its perceived quality and distinctive characteristics. However, based on the likely nature and scale of environmental impacts and the distance of the Proposed Development Site from residential areas and community receptors, the construction of the Proposed Development is not considered likely to lead to any potentially significant changes in local amenity. Therefore, effects on population health arising from impacts on environmental amenity are proposed to be **Scoped Out**.

Traffic

7.1.22 With consideration to the industrial location of the Proposed Development, proximity to the A-road network and design and control measures described in Section 6.13, it is expected that construction traffic and the movement of HGVs will not result in disruption or nuisance affecting the communities around the Proposed Development Site. Therefore, effects on population health arising from impacts of construction related traffic are proposed to be **Scoped Out**.

Green space and physical activity

- 7.1.23 Construction of the Proposed Development will take place largely within industrial land. Potential direct and indirect effects on PRoW or access to recreational green space and beaches will be assessed in the socio-economic assessment, Section 6.12. One of the proposed temporary construction facilities and laydown areas is adjacent to nature reserves (Teesmouth and Cleveland Coast NNR) and may slightly reduce the area of accessible green space temporarily during the construction phase. This slight reduction is not considered to potentially affect overall levels of access to green space. Due to the location of the Proposed Development Site, it is considered that any direct or indirect impacts on PRoW would not result in a significant reduction in access to green space or participation in physical activity at population level. Therefore, health effects arising from impacts on green space and physical activity are proposed to be **Scoped Out**.

Access and connectivity impacts

- 7.1.24 Potential impacts on the local road network resulting from construction traffic will be considered in the T&T assessment (see Section 6.13). Construction vehicle movements are anticipated to be a negligible proportion of background traffic flows. Given the proximity of the Proposed Development Site to the A-road network and the design and control measures described in Section 6.13, it is not considered likely that any community severance effects would arise as a result of construction traffic. Therefore, health effects arising from impacts on access and connectivity are proposed to be **Scoped Out**.

Social and economic impacts

- 7.1.25 Construction of the Proposed Development will create construction-related employment opportunities (see Section 6.12). There is a potential for beneficial effects on income and associated health and wellbeing if employment opportunities are targeted to areas of high unemployment and social deprivation. Effects on employment and income, including measures to maximise the positive benefits for the local economy by encouraging the use of local labour manufacturers and suppliers, where possible, will be considered in the socio-economic assessment.
- 7.1.26 Construction of the Proposed Development may also create opportunities for construction-related training and apprenticeships. There is a potential for beneficial effects if training opportunities are targeted to areas of high unemployment and social deprivation. The socio-economic assessment will consider measures to maximise training and skills opportunities for local communities.
- 7.1.27 Given the high levels of social deprivation in the study area, increased

employment and training opportunities have the potential to lead to beneficial effects on health, wellbeing and quality of life. These potential beneficial health effects are **Scoped in** to the EIA and will be assessed in the Socio-economic assessment (see Section 6.12).

Operation

Environmental Impacts

7.1.28 The following potential impacts on environmental determinants of health have been considered in this EIA Scoping Report:

- Noise and vibration (Section 6.11): The assessment criteria used in the noise assessment will take account of human responses to different types and levels of noise. There are potential noise and vibration impacts from the operation of the HPF, however given the distance to the closest residential receptor (2.1 km north-west at Marsh House Farm), there is no anticipated impact on residential receptors and therefore no LSE on population health.
- Air quality (Section 6.1): The air quality assessment considers the effects of the Proposed Development on pollutants linked to human health outcomes. Likely flaring and other point source emissions could result in emissions that impact air quality. The design of stacks, including the flare stack (currently expected to be up to 110 m height AGL) will consider the need to minimise potential risks to health and will be designed in accordance with regulatory requirements and the Environmental Permitting regime. Health outcomes will be taken into account in the significance criteria used in the air quality assessment, with sensitive human health receptors identified in the baseline. Due to the small number of sensitive receptors in the study area, no overall change in exposure to air pollution is expected at the population level and therefore there are no potential effects on population health.
- Visual impacts: (Section 6.7): The Proposed Development Site is within an industrial area and other than the HPF where built structures are proposed, the additional infrastructure will be predominantly below ground. Considering the closest residential receptor at 2.1 km north of the HPF Area, impacts during operation are not likely to result in significant adverse effects on residential visual amenity.
- Surface, ground water and soil contamination (Sections 6.6 and 6.14): Sensitive human health receptors will be identified in the contamination assessment baseline. The significance criteria used in this assessment take account of human health responses to contamination and mitigation measures will be provided to ensure compliance with regulations to protect health. The legal framework for the protection of water quality and the embedded mitigation to be included to achieve compliance are set out in Section 6.14. As a result of these measures, no LSE on population health are identified.

7.1.29 Consideration of human health is integral to these environmental assessments. While there may be potential environmental health effects on individual sensitive receptors, the likely scale of impact, taking into account embedded mitigation, is not considered to result in potential effects on health outcomes at the population level. Therefore, health effects arising from impacts on environmental determinants of health are proposed to be **Scoped Out**.

7.1.30 Combined environmental impacts, such as noise and visual impacts, have the potential to change local amenity, affecting people's attachment to and enjoyment of their local environment, its perceived quality and distinctive characteristics. Based on the distance of the Proposed Development Site from settlements and the likely nature and scale of environmental impacts, the operation of the Proposed Development is not considered to lead to any potential changes in local amenity. Therefore, health effects arising from impacts on environmental amenity are proposed to be **Scoped Out**.

Traffic

7.1.31 As described in Section 6.13: Traffic and Transport, operational traffic is not estimated to be significant (conservatively, an additional 140 staff vehicle movements (i.e. 70 vehicles in/ out accessing the Proposed Development Site per day spread over a 24 hour period on a shift system). Operational traffic is expected to utilise the nearby A road network. Therefore, health effects arising from traffic related disruption and annoyance are proposed to be **Scoped Out**.

Green space and physical activity

7.1.32 The Socio-economic scoping assessment (Section 6.12) has identified the potential for loss of amenity land and disruption of access to recreational green space during the operation of the Proposed Development (Table 6.69). The main HPF facility is located within an industrial area and the siting of AGI for the Hydrogen Pipeline(s) (which are subject to ongoing design development) will carefully consider existing land-use and seek to minimise the loss of green space. Whilst the Socio-economic assessment will consider these impacts, there are no likely effects on population-level health as a result of the expected impacts. Therefore, health effects arising from access to green space and physical activity are proposed to be **Scoped Out**.

Access and connectivity impacts

7.1.33 Once completed, operation of the Proposed Development (including maintenance) will not result in ongoing impacts to access or connectivity within the local area. Impacts from operational traffic are unlikely to meet the relevant screening criteria to require assessment in the T&T Chapter (as reported in Section 6.13). Due to the location and nature of the Proposed

Development Site, public transport usage and opportunities are limited (section 6.13.18). Local road congestion as a result of operation of the Proposed Development is very unlikely due to the proximity of the Proposed Development Site to the A-road network and industrial nature of the area, so access to community services and facilities is unlikely to be impacted. Therefore, health effects arising from impacts on access and connectivity during the operational phase are proposed to be **Scoped Out**.

Social and economic impacts

- 7.1.34 Operation of the Proposed Development has the potential to create regional employment opportunities pertaining to the O&M of the HPF and Hydrogen Pipeline (see Section 6.12).
- 7.1.35 There is a potential for beneficial effects on income and associated health and wellbeing if employment opportunities are targeted to areas of high unemployment and social deprivation. Effects on employment and income, including measures to maximise the positive benefits for the local economy by encouraging the use of local labour manufacturers and suppliers where possible, will be considered in the socio-economic assessment.
- 7.1.36 Operation of the Proposed Development may create opportunities for O&M-related training and apprenticeships. There is a potential for beneficial effects if training opportunities are targeted to areas of high unemployment and social deprivation. The socio-economic assessment will consider measures to maximise training and skills opportunities for local communities.
- 7.1.37 Given the high levels of social deprivation in the study area, increased employment and training opportunities have the potential to lead to beneficial effects on health, wellbeing and quality of life. These potential beneficial health effects are **Scoped In** to the EIA and will be assessed in the Socio-economic assessment (see Section 6.12).

Decommissioning

- 7.1.38 Potential impacts during the decommissioning phase are considered to be similar to the construction phase. The ES will provide a description of the activities and works (including the anticipated duration) which are likely to be required during decommissioning and where any LSE have been identified for construction stage activities (within sections of the ES where potential health effects are considered), the chapter will consider whether similar LSE could occur during decommissioning. Changes to baseline information that could happen in the intervening period would be addressed via a commitment to a DEMP, which would be secured via the draft DCO.

Embedded Mitigation

7.1.39 Embedded mitigation measures identified by the following topics in this EIA Scoping Report are relevant to human health:

- Air quality (Section 6.1);
- Ground conditions (Section 6.6);
- Noise and Vibration (Section 6.11);
- Socio-economics (Section 6.12);
- Traffic (Section 6.13); and
- Water Environment (Section 6.14).

7.1.40 Since no potential adverse effects on health and wellbeing have been identified, no further health mitigation is proposed.

Potential Likely Significant Effects

7.1.41 Table 7.5 provides a summary of the health elements that are proposed to be **Scoped In** or **Scoped Out** from the assessment, along with a justification for that decision.

Table 7.5: Human Health elements Scoped In or Scoped Out of the environmental impact assessment

Element	Phase	Scoped in	Scoped out	Justification
Environmental impacts	Construction (and decommissioning)		✓	Environmental impacts on sensitive receptors will be assessed in the relevant topic assessment chapters. These assessments include consideration of risks to human health at individual sensitive receptors. The scale of impacts, taking into account embedded and good practice mitigation measures, are not considered to result in any potential impacts on health outcomes at the population level.
	Operation		✓	
Traffic	Construction (and decommissioning)		✓	The proximity to the A road network and industrial location will reduce the risk of impacts on wellbeing and quality of life associated with

Element	Phase	Scoped in	Scoped out	Justification
	Operation		✓	increased traffic flows and HGV. Design and control measures outlined in Section 6.13 will mitigate disruption and annoyance associated with construction and operational traffic.
Green space and physical activity	Construction (and decommissioning)		✓	Minor reductions in some areas of publicly accessible green space during construction and operation are not considered to be material in terms of overall access to green space and opportunities for physical activity at a population level.
	Operation		✓	
Access and connectivity	Construction (and decommissioning)		✓	Due to proximity to A roads and the industrial nature of the area it is unlikely that access and connectivity to community services and facilities will be impacted by road congestion or increased journey time during construction. During operation, no significant additional traffic is anticipated.
	Operation		✓	
Economic and employment impacts	Construction (and decommissioning)	✓		There is a potential for positive effects on wellbeing and quality of life from employment opportunities during construction and operational phases. These effects will be considered in the socio-economic assessment (Section 6.12).
	Operation	✓		

Assumptions, Limitations and Uncertainties

7.1.42 The following limitations and assumptions have been identified:

- the consideration of potential impacts on health determinants is informed by the likely residual effects (after embedded mitigation measures have been taken into account) reported by other EIA topics. Any assumptions and limitations identified for these topics are therefore potentially applicable to the human health assessment; and

- the consideration of potential effects on population health undertaken for this EIA Scoping Report is based on professional judgement, taking account of relevant guidance and evidence stated in this section.

8 Summary

8.1 EIA Scoping Requirements

- 8.1.1 This EIA Scoping Report has identified the potential for LSE to arise from the construction, operation and maintenance and decommissioning of the Proposed Development and provides the information required to accompany a request for an EIA Scoping Opinion, in accordance with Regulation 10 of the EIA Regulations.
- 8.1.2 Where potential significant effects are considered likely, this EIA Scoping Report has described the approach to be used in assessments that will be undertaken for the EIA to characterise and understand the likely significance of these effects.
- 8.1.3 It also identifies those elements that are proposed to be scoped out of the EIA, on the basis that these would not result in LSE, and the rationale behind this conclusion. To assist PINS and consultees, justification for where aspects (topics) or matters⁴⁰⁹ are proposed to be scoped out from further assessment has been presented using PINS (2020) Advice Note 7, which provides the following tests (Box 1):

Box 1 - Advice Note Seven – Justification for Scoping Out Matters / Aspects	Abbreviation
Is there an impact pathway (IP) from the Proposed Development to the aspect/matter?	No IP
Is the aspect/matter sensitive to the impact concerned (not sensitive = NS)?	NS
Is the impact likely to be on a scale that may result in significant effects to the aspect/matter? (not on scale for significant effects NScSE)	NScSE
Could the impact contribute cumulatively with other impacts to result in significant effects to the aspect/ matter?	N/A as effects of all aspects/ matters scoped in will be considered in the cumulative effects assessment
Is there a method of avoidance (Av) or mitigation (Mit) that would reduce the impact on the aspect/matter to a level where significant effects would not occur?	Av/Mit
Is there sufficient confidence in the avoidance or mitigation method in terms of deliverability and efficacy to support the request (i.e. is this securable (Sec)?	tSec
Is there empirical evidence (Ev) available (Av) to support the request?	EvAv

⁴⁰⁹ PINS (2020) Advice Note Seven uses the term 'matters' to refer to subdivisions of environmental aspects

Do relevant statutory consultees (Con) agree with the request?	N/A generally as agreement sought via Scoping Opinion request. However, where relevant addressed as Con
Have you had regard to (a) relevant NPS and specifically any requirement stated in the NPS(s) in respect of the assessment of this aspect/matter	N/A – all matters proposed to be scoped out have considered relevant NPS

Table 8.1: Summary of the potential significant effects to be considered in the ES

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
Air Quality	C	Fugitive emissions of dust (human health and relevant ecological receptors within the screening distance) Construction traffic on affected road network (human health and relevant ecological receptors within the screening distance)		
	O	Emissions to air from operational plant within the Proposed Development (human health and relevant ecological receptors within the study area)	Operational road traffic (human health and relevant ecological receptors within the screening distance)	NScSE, Con It is unlikely that operational traffic movements will exceed recognised EPUK/ IAQM screening criteria, and an assessment is The increase in operational traffic is less than recognized screening

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
				criteria and is therefore proposed to be
	D	Fugitive emissions of dust (human health and relevant ecological receptors within the screening distance) Decommissioning traffic (human health and relevant ecological receptors within the screening distance)		
Biodiversity	C	Impacts on designated and non-designated sites and habitats (including NERC Section 41 priority and other habitats) through permanent loss and temporary landtake, Direct mortality and/or injury of protected and notable species (including, amphibians, badger,	Impacts on reptiles.	No IP, Con No records in local area and from previous surveys of the Proposed Development and additional local surveys, reptiles are assumed absent.

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
		bats, breeding and wintering birds, terrestrial invertebrates, riparian mammals). Disturbance and degradation on ecological features (designated sites, habitats and species), from changes in water quality, noise and vibration, dust, visual, and lighting Opportunities for biodiversity mitigation and enhancement		
	O	Disturbance of ecological features (as identified during construction) during operation, from changes in water quality, air quality and deposition, noise, visual and lighting.	Impacts on reptiles.	No IP, Con No records in local area and from previous surveys of the Proposed Development and additional local surveys, reptiles are assumed absent.

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
	D	Disturbance to ecological features is assumed to be similar to construction.	Impacts on reptiles.	No IP, Con No records in local area and from previous surveys of the Proposed Development and additional local surveys, reptiles are assumed absent.
Climate Change and Resilience and ICCI	C		CCR assessment	NS, AvMit and Sec It is unlikely that climate changes between present day and the construction period will be so different as to require further assessment. It is anticipated that construction best practice will mitigate any potential effects on- site during the construction period.
	C		ICCI assessment	NS, AvMit and Sec It is unlikely that climate changes between present day and the construction period will be so

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
				different as to require further assessment. It is anticipated that construction best practice will mitigate any potential effects on- site during the construction period.
	O	ICCI and CCR Assessment (Buildings and associated infrastructure, infrastructure structures, other infrastructure, transport, drainage, electrical equipment, construction and operational staff)		
	D	ICCI and CCR Assessment (Buildings and associated infrastructure, infrastructure structures, other infrastructure, transport, drainage, electrical equipment, construction and operational staff)		

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
Cultural Heritage	C		HPF Area - below ground and built heritage.	NS No cultural heritage impacts are predicted during construction due to the HPF Area being in an area of 1970s land reclamation, and no cultural heritage assets have been identified within the existing CATS Terminal or surroundings.
	O			
	D			
	C		Hydrogen Pipeline (east) - below ground and built heritage.	NS, No IP No cultural heritage impacts are predicted during construction along the route of the Hydrogen Pipeline (east). West of the River Tees it is within reclaimed land and is anticipated to follow existing pipeline routes. The River Tees crossing of the Hydrogen Pipeline (east) will be via the installation of a pipeline within a pre-existing tunnel or alternative
	O			
	D			

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
				trenchless crossing method, below the riverbed, requiring no new excavation (or repurposing of an existing pipeline). East of the River Tees, it is anticipated to follow existing pipeline routes.
	C	Heritage assessment for the Hydrogen Pipeline (west) Archaeological remains and deposits, including ridge and furrow earthworks (658) and previously unrecorded remains of Romano-British date which may be present at Saltholme, possible medieval ridge and furrow earthworks (1519) and archaeological features associated with the former anti-aircraft battery (6793) within		

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
		Proposed Development Site (inner study area). Temporary setting effects on designated built heritage assets (Cowpen Bewley Conservation Area and listed buildings within 200 m of the Proposed Development Site (outer study area)).		
	O	Built heritage assessment for the Hydrogen Pipeline (west) Permanent setting effects on designated built heritage assets (Cowpen Bewley Conservation Area and listed buildings within 200 m of the Proposed Development Site (outer study area)).	Hydrogen Pipeline (west) - below ground heritage.	No IP There is not expected to be any potential impacts to buried archaeology during the operational phase of the Proposed Development as any impacts will have occurred during the construction phase. Archaeology has therefore been Scoped Out of the assessment at the operation phase.

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	D	Designated historic assets within 1 km and high value designated assets within 5 km, non-designated built heritage within 1 km. Historic Landscape within 1 km.	Hydrogen Pipeline (west) - below ground and built heritage.	No IP, NS No built heritage impacts are predicted to arise during the decommissioning of the Hydrogen Pipeline (west). There is not expected to be any potential impacts to buried archaeology during the decommissioning phase of the Proposed Development as any impacts will have occurred and been mitigated during the construction phase.
Cumulative and Combined Effects	C	Cumulative and combined effects as a result of construction of the Proposed Development for all receptors unless otherwise stated in this table.		

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	O	Cumulative and combined effects as a result of operation of the Proposed Development.	The consented CCS process and technology beyond the CO ₂ export connection (shown in Figure 3.1 – Appendix A) is outside the scope of the GHG assessment.	NS In line with IEMA guidance (2022 ⁴²), a cumulative assessment of a specified list of developments is not considered appropriate or meaningful ⁴¹⁰ in terms of assessing the Proposed Development's impact on the receptor of the global climate..
	D		Cumulative and combined effects as a result of decommissioning	AvMit and Sec As the Proposed Development, for each Train, has an estimated design life of 25 years (which could be extended depending on market conditions and condition of the plant and equipment), cumulative effects during

⁴¹⁰IEMA Guidance states “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.”

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				decommissioning are not proposed to be considered as it is not possible to predict the developments that would be in progress at the point in time when decommissioning occurs.
Greenhouse Gases	C	GHG Assessment as specified in Section 6.5		
	O	As above		
	D	As above		
Ground Conditions	C	Mobilisation and migration of contamination to unsaturated soils, groundwater and surface watercourses. Creation of preferential pathways for the migration of soil contamination and gases. Potential impacts on groundwater from e.g. piling. Impacts from potential	Damage, disturbance or removal of geo-conservation or geodiversity sites.	No IP There are no geo-conservation or similar sites present within the vicinity of the Proposed Development Site.

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		contamination in dust and fine particulate matter to impact ecological receptors. Impacts on human health from contamination (dust and fine particulate matter) and groundwater. Any contamination removed, remediated, or mitigated leading to removal of contaminant sources from the source – pathway – receptor linkage (may result in potential beneficial impacts on human health, controlled waters, property receptors and ecological receptors).		
	O		Potential for future contamination of the ground	NScSE, AvMit and Sec, Con Any impacts of emissions to air, soil, surface and groundwater, to

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			associated with the operation of the HPF.	the environment and human health will be minimised and avoided using BAT as far as reasonably practicable, including through appropriate pollution prevention/ secondary containment measures and surface water management systems under the control of the Environmental Permit regulated by the Environment Agency.
	D	Potential impacts to geology and ground condition receptors during the decommissioning phase are assumed to be similar to the construction phase.	Damage, disturbance or removal of geo-conservation or geodiversity sites as none are present within the vicinity of the Proposed Development Site. Potential for future contamination of the ground associated with the decommissioning of the HPF.	NScSE, AvMit and Sec, Con Impacts during decommissioning of the Proposed Development will be controlled via the Environmental Permit and regulated by the Environment Agency. It is therefore reasonable to assume no likely significant environmental effects during

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				decommissioning (site permit surrender) of the HPF.
Landscape and Visual Impact Assessment	C	Changes to physical landscape features and overall character of the Proposed Development Site as a result of construction of the HPF. Changes to key characteristics of East Billingham to Teesmouth LCA as a result of construction of the Hydrogen Pipeline. Changes to physical landscape features and overall character of the Proposed Development Site as a result of construction of the Hydrogen Pipeline.	Changes to key characteristics of NCA 23: Tees Lowlands and East Billingham to Teesmouth LCA as a result of construction of the HPF. Changes to key characteristics of NCA 23: Tees Lowlands and Redcar and Cleveland LCA as a result of construction of the Hydrogen Pipeline. Changes to views experienced by motorists as a result of construction of the HPF along major highways, local roads between Hartlepool and Redcar (A178, A1185, A1085) and Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane.	NScSE, NS The local landscape is largely influenced by existing industrial development and has been identified in the published LCA for Stockton-on-Tees as being dominated by industrial features and hardstanding in poor condition. Given the relative scale of the proposed HPF and Hydrogen Pipeline to the identified NCA, and similarities between the proposed HPF and Hydrogen Pipeline and the surrounding industrial development, any effects from changes are unlikely to be significant. NScSE, NS

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		Changes to views as a result of construction of the Hydrogen Pipeline experienced by: motorists along local highways (Cowpen Bewley Road, Cowpen Lane, Wolviston Back Lane) recreational users of the King Charles III England Coast Path between Hartlepool and Redcar residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley) Visitors to Salholme Nature Reserve (NNR) Visitors to Cowpen Bewley Woodland Park.	Changes to views experienced by motorists as a result of construction of the Hydrogen Pipeline along major highways between Hartlepool and Redcar (A178, A1185, A1085). Changes to views experienced by recreational users of the King Charles III England Coast Path between Hartlepool and Redcar, NCN Route 14 around Hartlepool Bay, and NCN 65 around Middlesbrough Dock as a result of construction of the HPF. Changes to views experienced by recreational users of the NCN Route 14 around Hartlepool Bay, and NCN 65 around Middlesbrough Dock as	In these views, the proposed HPF (and where proposed to be scoped out, Hydrogen Pipeline) and the associated construction would typically be experienced in context with industrial buildings and structures including tall industrial stacks and flare stacks, and in a relatively busy landscape so any effects from are unlikely to be significant. As above

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			a result of construction of the Hydrogen Pipeline. Changes to views experienced by visitors to Teesmouth NNR, Saltholme Nature Reserve, Cowpen Bewley Woodland Park, the Teesdale Way Viewpoint along the South Gare Breakwater, the River Tees Viewpoint along the southern riverside, and the Eston Beacon within the North York Moors National Park as a result of construction of the HPF. Changes to views experienced by visitors to Teesmouth NNR, the Teesdale Way Viewpoint, the River Tees Viewpoint, and the Eston Beacon within the North York Moors National Park	

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			as a result of construction of the Hydrogen Pipeline. Changes to views as a result of construction of the HPF and Hydrogen Pipeline experienced by residents at the eastern edge of Hartlepool (Seaton Carew, Croft on Heagh) Changes to views as a result of construction of the HPF experienced by and residents at the northern edge of Middlesbrough (High Clarence, Cowpen Bewley).	
	O	As construction above except where scoped out.	Changes to views experienced by recreational users of the King Charles III England Coast Path between Hartlepool and Redcar during construction of the Hydrogen Pipeline.	NScSE In these views, the proposed Hydrogen Pipeline would typically be screened or experienced in context with existing above ground pipelines and associated

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			Changes to views experienced by visitors to Saltholme Nature Reserve during construction of the Hydrogen Pipeline.	infrastructure, so changes are unlikely to be significant. Given the abundance of intervening vegetation in and around the Nature Reserve, changes in these views resulting from the existence and operation of the proposed Hydrogen Pipeline are unlikely to be significant.
	D	As construction above.	As construction above.	As construction above.
Marine Biodiversity	C	Injury or disturbance as a result of underwater noise and vibration for the works within existing tunnels and Wastewater Connection Corridor. Direct loss and physical disturbance to marine habitats	Direct loss and physical disturbance to marine habitats and species within existing tunnels.	No IP No in-river works are proposed as part of the dewatering or pipeline installation within existing tunnels or for any MBT/ HDD option. As there will be no available pathway there will therefore be no LSE for marine biodiversity.

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		and species and change in water quality within the Wastewater Connection Corridor.	Change in water quality within existing tunnels.	AvMit and Sec The CEMP would contain procedures to avoid changes to water quality. A commitment to produce a CEMP would be secured through the draft DCO and a Framework CEMP would be included with the Application including mitigation measures.
	O		Injury or disturbance as a result of underwater noise and vibration, direct loss and physical disturbance to marine habitats and species and change in water quality within existing tunnels and Wastewater Connection Corridor.	No IP Pipelines installed within existing tunnels and/ or HDD/ MBT installed pipelines, once operational, would be a fully enclosed system which does not interact with the marine environment. Routine planned maintenance works would not generate noise or vibration that

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				would exceed background levels or generate any potential water pollution or sedimentation. No IP, NScSE No underwater noise or vibration impacts, habitat loss or disturbance to marine habitats or species are anticipated during operation of the Wastewater Connection. The permanent discharge associated with the Wastewater Connection Corridor will meet legal standards for wastewater discharge.
	D	Injury or disturbance as a result of underwater noise and vibration within existing tunnels and Wastewater Connection Corridor.	Direct loss and physical disturbance to marine habitats and species within existing tunnels.	No IP No in-river works are proposed as part of the decommissioning of any tunnel or MBT/ HDD option. As there will be no available

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		Direct loss and physical disturbance to marine habitats and species and change in water quality within the Wastewater Connection Corridor.	Change in water quality within existing tunnels.	pathway there will therefore be no LSE for marine biodiversity. AvMit and Sec The DEMP would contain procedures to avoid changes to water quality. A commitment to produce a DEMP would be secured through the draft DCO.
Material Assets and Waste	C	Changes in availability of materials during construction of the HPF and Hydrogen Pipeline. Changes in available landfill void capacity during construction of the HPF and Hydrogen Pipeline.		
	O	Changes in availability of materials during operation of the HPF.	Changes in availability of materials during operation of the Hydrogen Pipeline.	No IP Additional materials would not be consumed, and additional waste

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		Changes in available landfill void capacity during operation of the HPF.	Changes in available landfill void capacity during operation of the Hydrogen Pipeline.	would not be generated during operation of the Hydrogen Pipeline
	D		Changes in availability of materials during decommissioning of the HPF and Hydrogen Pipeline. Changes in available landfill capacity during decommissioning of the HPF and Hydrogen Pipeline.	AvMit and Sec A DEMP would contain guidance on how materials and waste impacts and effects can be removed or mitigated. A commitment to produce a DEMP would be secured through the draft DCO.
Major accidents and disasters	C	Engineering Accidents/ Failures (Nuclear accident) relating to Hartlepool Nuclear Power Station (MA&D1).	Construction Hazards Geological Disasters Hydrological Disasters Meteorological Disasters Hydrological Hazards Technological and Manmade Hazards	NScSE, AvMit and Sec Refer to screening rationale in Appendix G. This initial long list of credible MA&D risk events will remain subject to review during design development and may therefore change as more

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			Transport Disasters Engineering Accidents/ Failures other than those scoped in Operational process hazards other than those scoped in Societal Hazards	information becomes available during the course of the ES.
	O	Engineering Accidents/ Failures (Nuclear accident) relating to Hartlepool Nuclear Power Station (MA&D1). Vulnerability of the Proposed Development to existing off-site operational process hazards (fire MA&D2, explosion MA&D3, domino event MA&D4, toxic and / or asphyxiant gas release MA&D5) for the identified receptors 'in scope'.	As construction above other than those scoped in	As above

Matter/ Technical Topic	Development Stage Construction (C) Operation (O) Decommissioning (D)	Aspects Scoped into EIA	Aspects Scoped Out	Rationale for Scoping Out (where proposed) No IP - no impact pathway NS – aspect not sensitive to impact NScSE – impact not on scale for significant effects AvMit and Sec– Significant effect avoidable or can be mitigated to not significant AND mitigation confidence high/ can be secured Con – statutory consultee agreement reached/propose
		The potential for the Proposed Development to contribute to a major accident with potential significant adverse environmental effects relating to operational process hazards of the Proposed Development (fire MA&D2, explosion MA&D3, domino event MA&D4, toxic and / or asphyxiant gas release MA&D5) for the identified receptors 'in scope'.		
	D	Engineering Accidents/ Failures (Nuclear accident) relating to Hartlepool Nuclear Power Station (MA&D1).	Decommissioning Hazards	AvMit and Sec Hazards will be controlled via a DEMP produced and agreed with the Environment Agency as part of the Environmental Permit surrender. The DEMP would contain guidance on how risks can be eliminated or mitigated, taking

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				into consideration the status and risks associated with infrastructure at that point in time. In addition, decommissioning will be undertaken considering relevant safety legislation including COMAH Regulations 2015, the CDM Regulations 2015, the Health and Safety at Work Act 1974 and the Management of Health and Safety at Work Regulations 1999 (or subsequent replacement legislation). Details of the decommissioning will be included in the DEMP to control the risk of a MA&D risk event to ALARP.
Noise and Vibration	C	Noise Emissions (HPF and Hydrogen Pipeline)	Construction traffic vibration assessment	NScSE Forecast construction traffic flows are not of sufficient magnitude to

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		Vibration emissions (HPF and Hydrogen Pipeline) Construction traffic noise (HPF and Hydrogen Pipeline)		result in a material change in road traffic vibration levels.
	O	Plant noise emissions (stationary sources) HPF	Operational road traffic noise HPF Operational vibration emissions HPF Operational noise Hydrogen Pipeline	NScSE No sources of operational vibration that would be perceptible at sensitive receptors would be introduced within the HPF. No IP Routine operation of the Hydrogen Pipeline would not result in any increase in noise at NSR. NScSE Forecast operational traffic flows are not of sufficient magnitude to result in a material change in road traffic noise levels.

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	D	As construction above	As construction above	As construction above
Socio-economics	C	Temporary direct and indirect employment and impact on GVA as a result of construction of the HPF and Hydrogen Pipeline. Impact on the demand for housing, accommodation, and local services as a result of construction of the HPF and Hydrogen Pipeline (including in combination with other projects taking place in the local area). Temporary or permanent disruption to traffic on the local and SRN. Impacts on recreation as a result of construction of the HPF and Hydrogen Pipeline.	Impact in population structure due to increased demand for labour as a result of construction of the HPF and Hydrogen Pipeline. Impact on tourism economy as a result of construction of the HPF and Hydrogen Pipeline.	NScSE Population increase is temporary and at its peak during construction but is not expected to have a significant impact long-term on demographic structure. NS Tourism is not a significant sector in the area, with a high concentration of industrial activity.

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	O	As construction above aside from where scoped out.	Impact on the demand for housing, accommodation, and local services as a result of operation of the HPF and Hydrogen Pipeline.	NScSE There is not expected to be any long-term impact as a result of the permanent workforce (for operational phase).
	D	As construction above aside from where scoped out.	Impact on the demand for housing, accommodation, and local services as a result of decommissioning of the HPF and Hydrogen Pipeline.	NScSE There is not expected to be any long-term impact as a result of the workforce (for decommissioning phase).
Traffic and Transportation	C	The construction phase will give rise to an increase in HGV (for deliveries) and light vehicle (construction staff) movements as well as AIL on the affected highway network that require assessment.		
	O		Operational Traffic Assessment	NScSE, Con

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				The scale of potential traffic proposed is not considered to require an assessment of the operational phase within the ES Chapter. A description of the operational traffic flows will be presented in the TA that will form an appendix of the ES.
	D		Decommissioning Traffic Assessment	NScSE, Con Any impact is likely to be similar to or less than that assessed at the construction phase. The TA will include a simple sensitivity test on predicted traffic flows (including anticipated duration) which could be required during decommissioning, and a description of how these compare to the impacts during the construction phase assessed. This

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				aspect will not be assessed in the ES Chapter as significant effects not considered likely.
Water Environment	C	Changes to surface water quantity, quality, hydromorphology of watercourses, changes to groundwater quantity and groundwater quality, and flood risk impacts.		
	O	As construction above except where scoped out	Changes to groundwater quality	No IP During operation there is no pathway that has been identified between the Proposed Development and groundwater receptors. Therefore, changes to groundwater quality has been Scoped Out.
	D	As construction above		

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Human Health	C	Employment and income and education and training opportunities, including provision of economic opportunities and resources (potential for positive effects on wellbeing and quality of life from employment opportunities during construction phase will be considered in the socio-economic assessment).	Access to healthcare and other social infrastructure services, both in terms of potential increases in road traffic and increase in workforce population. Human health impacts associated with air quality, noise and vibration, flood risk, and surface water impacts.	NScSE, AvMit and Sec The proximity to the A road network and industrial location will reduce the risk of impacts on wellbeing and quality of life associated with increased traffic flows and HGV. Design and control measures outlined will mitigate disruption and annoyance associated with construction and operational traffic. NScSE Environmental impacts on sensitive receptors will be assessed in the relevant topic assessment chapters. These assessments include consideration of risks to human health at individual sensitive receptors. The scale of impacts,

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			Access and connectivity to open space, PRow, recreational facilities and opportunities for physical activity and active travel that protect and promote good health (e.g. greenspace and physical activity).	taking into account embedded and good practice mitigation measures, are not considered to result in any potential impacts on health outcomes at the population level. NScSE, No IP Minor reductions in some areas of publicly accessible green space during construction and operation are not considered to be material in terms of overall access to green space and opportunities for physical activity at a population level. Due to proximity to A roads and the industrial nature of the area it is unlikely that access and connectivity to community services and facilities will be impacted by road congestion or

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				increased journey time during construction.
	O	As construction above	As construction above	As construction above. During operation, no significant additional traffic is anticipated.
	D	As construction above	As construction above	As construction above

Structure of the ES

- 8.1.4 Section 5.1 of this EIA Scoping Report explains the general format proposed for the ES (technical chapters 6-22 listed alphabetically). Considering the aspects/ matters in Table 8.1 proposed to be scoped in, Table 8.2 provides the proposed structure of the ES that will accompany the Application.

Table 8.2 - Structure of the Environmental Statement

Chapter	Volume II – Main Statement	Volume II – Technical Appendices
1	Introduction	1a – EIA Scoping Report 1b – EIA Scoping Opinion 1c – Statement of Competence
2	Methodology and Consultation	Intentionally blank
3	Description of the Existing Environment	Intentionally blank
4	The Proposed Development	Intentionally blank
5	Construction Programme and Management	5a – Crossings Schedule
6	Project Alternatives	Intentionally blank
7	Planning Policy and Need	7a - Legislative, Policy and Guidance Framework for Technical Topics
8	<i>Air Quality</i>	Supporting technical appendices as relevant
9	<i>Biodiversity</i>	Supporting technical appendices as relevant
10	<i>Climate Change and Resilience</i>	Supporting technical appendices as relevant
11	<i>Cultural Heritage</i>	Supporting technical appendices as relevant
12	<i>Cumulative and Combined Effects</i>	Supporting technical appendices as relevant
13	<i>Greenhouse Gases</i>	Supporting technical appendices as relevant
14	<i>Ground Conditions</i>	Supporting technical appendices as relevant
15	<i>Landscape and Visual Impact Assessment</i>	Supporting technical appendices as relevant
16	<i>Marine Biodiversity</i>	Supporting technical appendices as relevant
17	<i>Material Assets and Waste</i>	Supporting technical appendices as relevant
18	<i>Major Accidents and Disasters</i>	Supporting technical appendices as relevant
19	<i>Noise and Vibration</i>	Supporting technical appendices as relevant
20	<i>Socio-economics</i>	Supporting technical appendices as relevant
21	<i>Traffic and Transportation</i>	Supporting technical appendices as relevant
22	<i>Water Environment</i>	Supporting technical appendices as relevant
23	Summary of Likely Significant Residual Effect	23a – Mitigation Schedule 23b – Commitments Register

