

H2Teesside Project

Environmental Statement

Volume III – Appendices

Appendix 1A: Environmental Impact Assessment Scoping Report

Document Reference: 6.4.1

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended)

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)



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GLOSSARY

Abbreviation	Term
AEP	Annual Exceedance Probability
AGI	Above Ground Installation
AIL	Abnormal Indivisible Load
ALARP	As Low As Reasonably Practicable
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
APFP Regulations	Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended)
Applicant	H2 Teesside Limited
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ASU	Air Separation Unit
ATR	Auto Thermal Reforming
BAP	Biodiversity Action Plan
BEIS	Former Department for Business, Energy and Industrial Strategy
BESS	British Energy Security Strategy
bgl	Below ground level
BGS	British Geological Survey
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
BOC	British Oxygen Company
BRE	Building Research Establishment
BRES	Business Register and Employment Survey
BS	British Standard
BSI	British Standards Institute
BTO	British Trust for Ornithology
CAA	Civil Aviation Authority
CCPP	Combined Cycle Power Plant (see also CCGT)
CCR	Carbon Capture Readiness
CCR	Climate Change Resilience
CCS	Carbon Capture and Storage
CCG	Clinical Commissioning Group

Abbreviation	Term
CCGT	Combined Cycle Gas Turbine
CCUS	Carbon Capture, Usage and Storage
CDM	Construction (Design and Management) Regulations 2007
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CH ₄	Methane
CHP	Combined Heat and Power
CIBSE	Chartered Institution of Building Services Engineers
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CLP	Classification, Labelling and Packaging Regulations
CO	Carbon monoxide
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
COMAH	Control of Major Accident Hazards
COPA	Control of Pollution Act 1974
COPD	Chronic Obstructive Pulmonary Disease
CRoW	Countryside and Rights of Way
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
COVID-19	Coronavirus
CTMP	Construction Traffic Management Plan
CWS	Cooling Water System
CWTP	Construction Worker Travel Plan
DAF	Dissolved Air Flotation
DAS	Discretionary Advice Service
DBA	Desk-Based Assessment
DCLG	Former Department for Communities and Local Government (now DLUHC)
DCO	Development Consent Order
DECC	Former Department of Energy and Climate Change (later part of BEIS, now DESNZ)
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DLL	District Level Licencing
DLUHC	Department for Levelling-up, Housing and Communities
DML	Deemed Marine Licence
DMRB	Design Manual for Roads and Bridges
DMW	Demineralised Water
DNA	Deoxyribonucleic Acid
DTM	Digital Terrain Model
EclA	Ecological Impact Assessment
eDNA	Environmental DNA
EEA	European Economic Area
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment

Abbreviation	Term
EMF	Electromagnetic Fields
EMODnet	European Marine Observation Data Network
EMS	Environmental Management System
EPC	Engineering, Procurement and Construction
EPSM	European Protected Species Mitigation (Licence)
ERIC	Environmental Records Information Centre North-East
ES	Environmental Statement
ETP	Effluent Treatment Plant
EU	European Union
EUNIS	European Union Nature Information System
EWP	Energy White Paper
FEED	Front End Engineering Design
FRA	Flood Risk Assessment
FRfSW	Flood Risk from Surface Water
GAC	Generic Assessment Criteria
GCN	Great Crested Newt
GHG	Greenhouse Gas
GI	Ground Investigation
GLVIA3	Guidelines for Landscape & Visual Impact Assessment (third edition)
GWth	Gigawatt Thermal
H ₂	Hydrogen (gaseous)
Ha	Hectare
HCA	Former Homes and Communities Agency
HDD	Horizontal Directional Drill
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HPI	Habitat of Principal Importance
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
HSI	Habitat Suitability Index
HV	High Voltage
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
ICCI	In-combination Climate Change Impacts
ICES	International Council for the Exploration of the Sea
IEA	Institute of Environmental Assessment
IEMA	Institute of Environmental Management and Assessment
IHBC	Institute of Historic Building Conservation
INCA	The Industry Nature Conservation Association
INNS	Invasive and Non-Native Species
ISO	International Organization for Standardization
JNCC	Joint Nature Conservation Committee
kV	Kilovolt
LHV	Lower Heating Value
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve

Abbreviation	Term
LP	Low Pressure
LPA	Local Planning Authority
LSOA	Lower Layer Super Output Area
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographical Information for the Countryside
MA&Ds	Major Accidents and (Natural) Disasters
MBT	Micro-bored Tunnel
MCAA	Marine and Coastal Access Act (2009)
MCZ	Marine Conservation Zones
MHCLG	Ministry of Housing, Communities and Local Government
MHWS	Mean High Water Springs
ML	Marine Licence
MMO	Marine Management Organisation
MNCR	Marine Nature Conservation Review
MAOP	Maximum Allowable Operating Pressure
MoU	Memorandum of Understanding
MP	Medium Pressure
MPA	Mineral Planning Authority
MPS	Marine Policy Statement
MSA	Mineral Safeguarding Area
Mt	Megatonne
MW	Megawatt
NBN	National Biodiversity Network
NCA	National Character Area
NEP	Northern Endurance Partnership
NERC Act	Natural Environment and Rural Communities Act (2006)
NGG	National Gas Grid
NGR	National Grid Reference
NH ₃	Ammonia
NNR	National Nature Reserve
NO _x	Oxides of Nitrogen
NPG	Northern Power Grid
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptor
NTS	Non-Technical Summary
NZT	Net Zero Teesside
O ₂	Oxygen
ONS	Office for National Statistics
PA 2008	Planning Act 2008
PAH	Polycyclic Aromatic Hydrocarbon
PCC	Power, Capture and Compressor
PEI	Preliminary Environmental Information

Abbreviation	Term
PINS	Planning Inspectorate
PHE	Public Health England, the former name of the UK Health Security Agency
PHOF	Public Health Outcomes Framework
PM	Particulate Matter
PM _{2.5}	Particulate matter of 2.5 micrometres (µm) diameter or less
PM ₁₀	Particulate matter of 10 micrometres (µm) diameter or less.
PPG	Planning Practice Guidance
PRoW	Public Right of Way
PSA	Pressure Swing Adsorber
PSR	Pipelines Safety Regulations
PSYM	Predictive System for Multimetrics
PWS	Private Water Supply (abstractions)
RBT	Redcar Bulk Terminal
RCBC	Redcar and Cleveland Borough Council
REC	Redcar Energy Centre
REP	Renewable Energy Plant
RO	Reverse Osmosis
RMP	Regeneration Master Plan
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCANS	Small Cetacean Abundance in the European Atlantic and North Sea
SCOS	Special Committee on Seals
SCR	Selective Catalytic Reduction
SMRU	Sea Mammal Research Unit
SMU	Seal Management Unit
SNS	Southern North Sea
SoCC	Statement of Community Consultation
SoS	Secretary of State
SO _x	Sulphur Oxides
SPA	Special Protection Area
SPZ	Source Protection Zone
SSI	Sahaviriya Steel Industries (UK Limited)
SSSI	Site of Special Scientific Interest
STBC	Stockton-on-Tees Borough Council
STDC	South Tees Development Corporation
STG	Steam Turbo Generator
SuDS	Sustainable (urban) Drainage System
SPD	Supplementary Planning Document
Syngas	Mixture comprising H ₂ , CO, and CO ₂ produced at an intermediary stage of Blue Hydrogen production
TA	Transport Assessment
TraC	Transitional and Coastal
TTWA	Travel to Work Area
TVCA	Tees Valley Combined Authority
UF	Ultrafiltration
UK	United Kingdom

Abbreviation	Term
UKCP18	UK Climate Projections 2018
UPS	Uninterruptable Power Supply
UXO	Unexploded Ordnance
WBCSD	World Business Council for Sustainable Development
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WHO	World Health Organisation
Withdrawal Act	European Union Withdrawal Agreement Act (2020)
WPA	Waste Planning Authority
WRI	World Resources Institute
WwTW	Wastewater Treatment Works
ZTV	Zone of Theoretical Visibility

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1.0 INTRODUCTION

1.1 Background

- 1.1.1 AECOM Ltd ('AECOM') has been commissioned by H2 Teesside Ltd (hereafter referred to as 'the Applicant') to prepare an Environmental Impact Assessment (EIA) Scoping Report to inform the scope and content of an EIA for the construction, operation (including maintenance where relevant) and decommissioning of a 1.2 Gigawatt Thermal (GWth) Hydrogen Production Facility with associated Carbon Capture and hydrogen transport pipeline network on land in Redcar and Cleveland, Stockton-on-Tees, and Hartlepool on Teesside (hereafter referred to as the 'Proposed Development Site') (see Figure 1, Appendix A).
- 1.1.2 The Hydrogen Production Facility (hereafter referred to as the 'Production Facility') together with the hydrogen gas (H₂) pipeline network to deliver low carbon H₂ to offtakers who may potentially use the H₂ in the future, and the CO₂ export, natural gas, electricity, water, oxygen (O₂) and nitrogen (N₂) connections required for the facility to operate are herein referred to as the 'Proposed Development'. The proposed Production Facility will produce low carbon hydrogen which is compliant with the UK Government's Low Carbon Hydrogen Standard (Department for Business, Energy and Industrial Strategy (BEIS), 2022) 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.
- 1.1.3 The Proposed Development is subject to ongoing technical studies; however, it is expected to comprise the Production Facility with a design capacity of up to 1.2 GWth Lower Heating Value (LHV), across two phases of development (up to 600 Megawatt thermal (MWth) per phase).
- 1.1.4 The Production Facility and associated infrastructure which form part of the Proposed Development will be located on the 'Main Site'. There are currently two Main Site options – the Foundry ('Main Site A') on land formerly part of the Redcar Steelworks and adjacent land at Redcar Bulk Terminal (RBT) ('Main Site B'), as indicated on Figures 3 and 3a (Appendix A) respectively.
- 1.1.5 The proposed hydrogen transport pipelines and other connections (the 'Connection Corridors') will also cross other third-party land where required. Together, the Main Site and Connection Corridors are referred to as the Proposed Development Site.
- 1.1.6 The Proposed Development Site boundary and the location of the two Main Site options, Hydrogen Pipeline Corridor and indicative other Connection Corridors are shown in Figures 3-9 in Appendix A.
- 1.1.7 This EIA Scoping Report considers the environmental context of the Proposed Development Site and the potential environmental impacts of the Proposed Development. Where impacts are considered to have the potential to cause significant environmental effects, these are identified and the proposed approach to be used to characterise the impacts and understand the significance of their effects

is outlined. This report also outlines issues perceived to be non-significant, which do not require formal assessment as part of the EIA.

1.1.8 EIA is an iterative process that feeds into the engineering design process to identify potential significant environmental effects which require mitigation. The final design iteration, along with the findings of the EIA will be reported in an Environmental Statement (ES), in accordance with the Infrastructure Planning (EIA) Regulations 2017 ('EIA Regulations') and will be submitted with the Development Consent Order (DCO) application ('the Application') in accordance with Regulation 5 (2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended) ('APFP Regulations').

1.2 Consenting Regime

Development Consent Orders

1.2.1 Under the Planning Act 2008 (PA 2008), development consent can be granted in the form of a DCO for certain types of 'Nationally Significant Infrastructure Projects' (NSIPs) by the relevant Secretary of State (SoS) – in the case of energy infrastructure projects this is the SoS for the Department of Energy Security and Net Zero (DESNZ).

1.2.2 Section 14 'Nationally significant infrastructure projects: general' of the PA 2008 confirms the types of projects that are NSIPs and which require development consent. Section 14 does not include the construction and operation of H₂ production facilities but does include the "*construction of a pipe-line other than by a gas transporter*" that would require "*authorisation under ... the Pipe-lines Act 1962*". According to the Pipe-Lines Act, a cross-country pipeline means a pipeline whose length exceeds, or is intended to exceed 16.093 km (i.e. 10 miles), and a pipeline is defined as a pipe or system of pipes for the conveyance of anything other than air, water, water vapour or steam. Therefore, the hydrogen pipeline as currently proposed would require development consent.

1.2.3 Although works to construct and operate the Production Facility itself do not fall under the definition of a NSIP, the Applicant has sought a direction under Section 35 of the PA 2008 from the SoS to give a direction that the Hydrogen Production Facility should be treated as development for which development consent is required under Section 35 of the 2008 Act alongside the hydrogen pipelines. On the 22nd December 2022 the SoS took the decision within the conditions as required by sections 35A of the PA 2008, and issued a Direction under sections 35(1) and 35ZA that the Hydrogen Production Facility and any aspect of the hydrogen pipelines that are not automatically 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 that development.

1.2.4 As a result of the above, the Applicant is required to seek a DCO to construct and operate the Proposed Development, under the PA 2008. Section 37 governs the form, content and accompanying documents that are required as part of a DCO application. The requirements are implemented through the APFP Regulations which

state that an application must be accompanied by an ES, where a development is 'EIA development' under the EIA Regulations.

- 1.2.5 The Application will be submitted to the Planning Inspectorate ('PINS') who will examine the application and make recommendations to the SoS for DESNZ pursuant to the PA 2008, who will subsequently determine whether a DCO should be granted for the Proposed Development.

Environmental Impact Assessment

- 1.2.6 Regulation 3(1) of the EIA Regulations defines the meaning of 'EIA development' (with reference to Schedules 1 and 2 to the EIA Regulations).
- 1.2.7 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 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*".
- 1.2.8 Based on current projections (including Phase 1 and Phase 2 of the Proposed Development), H2Teesside will have the capacity to continuously export approximately 2.84 Megatonnes (Mt)/year (at 100% utilisation) of dehydrated and compressed carbon dioxide (CO₂), with no on-site temporary CO₂ storage required, resulting in the capture of more than 1.5 Mt of CO₂ per year for onward geological storage to the off-shore Endurance store via Northern Endurance Partnership (NEP) infrastructure on the nearby Net Zero Teesside (NZN) site. The NEP infrastructure and Endurance store will both be separately consented.
- 1.2.9 Although part of the Proposed Development meets the description of development in Schedule 1 and therefore EIA would be required, a review of Schedule 2 has also been completed for thoroughness.
- 1.2.10 When considering the Proposed Development in relation to the descriptions of development for the purposes of definition of 'Schedule 2 Development' it is considered that the Proposed Development does meet the following descriptions:
- *3(a) industrial installations for the production of electricity, steam and hot water (projects not included in Schedule 1 to these Regulations);*
 - *3(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*
 - *10(k) oil and gas pipeline installations (unless included in Schedule 1 to these Regulations).*
- 1.2.11 Given the above the Proposed Development is considered 'EIA development' and consequently a formal EIA screening opinion is not being sought from the SoS. Furthermore, having regard to the nature and scale of the proposed activities

comprised in the overall Proposed Development, such that some form of environmental assessment would likely be required in any event (even if not EIA) for the aspects that are not 'EIA development', the Applicant intends to provide all environmental assessments for the Proposed Development in a single ES.

- 1.2.12 This report constitutes the Applicant's notification under Regulation 8(1b) of the EIA Regulations. Having determined that an ES will be included as part of the Application, which will present the details of the EIA of the Proposed Development, in accordance with 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 in respect of the full Proposed Development.
- 1.2.13 The indicative Proposed Site Boundary (referred to as the 'Proposed Development Site') is shown on Figure 2: Proposed Development Site Boundary (including location of Main Site A) and Figure 2a: Proposed Development Site Boundary (including location of Main Site B), in Appendix A. At this stage, the Proposed Development Site Boundary has been refined as much as possible based on current design information and reflects a worst-case scenario of those areas that may be required for the construction and operation of the Proposed Development, including the Production Facility, hydrogen pipeline and connections, as well as indicative laydown areas for construction. The Proposed Development Site will be further refined as the design and further studies progress.

Deemed Marine Licence

- 1.2.14 In England, the Marine and Coastal Access Act 2009 (MCAA) provides that a Marine Licence (ML) is required for certain 'licensable activities' within the UK Marine Area (Section 42, MCAA). For the purposes of the EIA, the marine environment is defined as any area seaward of the mean high-water springs (MHWS) mark of any tidally influenced water body (anything below MHWS). This includes intertidal zones, which are periodically exposed by the tide and subtidal zones which are always submerged.
- 1.2.15 It is acknowledged that for the purposes of marine consenting, the UK Marine Area (Section 42, Marine and Coastal Access Act 2009) also includes areas which are temporarily or permanently separated from the natural course of the tide (i.e. by a lock gate or other similar means).
- 1.2.16 MLs can be issued via a 'standalone' Marine Licence Application (MLA) or a licence 'deemed' within the body of the DCO (i.e. a Deemed Marine Licence (DML)). The Marine Management Organisation (MMO) is the body responsible for issuing, revoking and enforcing a ML, other than where a licence is in the form of a DML, in which case the SoS has the power to grant it.
- 1.2.17 Some aspects of the Proposed Development are likely to require a ML, namely the construction and operation of the crossing of the River Tees for the proposed hydrogen pipeline, and the potential for crossings of Greatham Creek where below MHWS, north of the Tees and to the west of the Main Sites. The design work for all crossings is ongoing, however, currently it is proposed that the crossing under the Tees will be constructed using either Horizontal Directional Drilling (HDD) or Micro

Bored Tunnelling (MBT) techniques, thereby minimising disturbance during construction. For other areas including the areas around Greatham Creek and Seal Sands various construction methodologies are being considered. Further detail is provided in Section 3.5.

- 1.2.18 The Application will therefore include a request to secure the ML for activities below MHWS via a DML. The scope of the DML will be discussed and agreed in consultation with the MMO throughout the DCO process.

1.3 The Applicant

- 1.3.1 The Applicant is H2 Teesside Limited, a bp company, who will be the lead developer and operator for the Production Facility and new hydrogen pipelines. The Proposed Development will support the decarbonisation of UK-produced natural gas landed in Teesside for use in industrial applications and is also a key contributor to restoring manufacturing jobs in the Tees Valley as well as towards achieving national targets in relation to net zero.

- 1.3.2 H2Teesside will export CO₂ to the NEP offshore storage facility via NEP infrastructure on the adjacent NZT site including the high pressure compression facility and the CO₂ export pipeline. The DCO application for NZT is due to be determined by the SoS by 10th May 2023.

1.4 Purpose of Scoping

- 1.4.1 The scoping phase of the EIA process provides a framework for identifying potential significant environmental effects which may arise as a result of the Proposed Development, and distinguishing the priority issues to be addressed at the assessment stage (i.e. within the ES). It also identifies those matters, where possible, which do not need to be assessed in detail and can be 'scoped out'.

- 1.4.2 The Scoping Report facilitates early pre-application engagement with key statutory consultees and stakeholders on the Proposed Development, as well as the proposed structure, methodology and content of the EIA.

- 1.4.3 This Scoping Report has been prepared in accordance with the relevant legislative provisions and associated Advice Notes (published by PINS).

- 1.4.4 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 and as set out in Paragraph 4.2 (and the associated Insert 2) of Advice Note Seven 'Environmental Impact Assessment: Preliminary Environmental Information and Environmental Statements' (PINS, 2020). Table 1-1 signposts to where that information is provided within this Scoping Report.

Table 1-1: Information Required for a Request for a Scoping Opinion

DESCRIPTION OF INFORMATION REQUIRED (REGULATION 10(3))	SUPPLEMENTARY DESCRIPTIONS (REGULATION 8(3))	SECTION IN SCOPING REPORT WHERE INFORMATION PRESENTED
A plan sufficient to identify the land	-	EIA Scoping Figures 1-8 (Appendix A)
A description of the proposed development, including its location and technical capacity	A description of the physical characteristics of the whole development; and a description of the location of the development, with particular regard to the environmental sensitivity of geographical areas likely to be affected.	Section 1-4 Section 2, 3 and 6
An explanation of the likely significant effects of the development on the environment	...resulting from: the expected residues and emissions and the production of waste, where relevant; and the use of natural resources, in particular soil, land, water and biodiversity.	Section 6 Section 3 and 6
Such other information or representations as the person making the request may wish to provide or make	-	See Table 1-2

1.4.5 PINS Advice Note Seven (PINS, 2020) recommends the information is presented in the form of a Scoping Report that includes the information required by the EIA Regulations (as presented in Table 1-1) together with more detailed/additional information as presented in Table 1-2.

1.4.6

Table 1-2: Information to be Provided in the Scoping Report

DESCRIPTION OF INFORMATION REQUIRED	SECTION IN SCOPING REPORT WHERE THE 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.	Section 1-4
Referenced plans presented at an appropriate scale to convey clearly the information and all known aspects associated with the Proposed Development.	EIA Scoping Figures (Appendix A)
EIA Approach and Topic Areas	
An outline of the reasonable alternatives considered and the reasons for selecting a preferred option.	Section 4 (Alternatives)
A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues.	Section 8 (Summary)
A detailed description of the aspects and matters proposed to be scoped out of further assessment with justification provided.	Section 6 (Scope of the Assessment for each environmental topic) Section 8 (Summary)
Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters.	Section 2 (Description of the existing environment) Section 6 (Baseline Conditions and Scope of the Assessment for each environmental topic)
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).	Section 6 (Baseline Conditions and Scope of the Assessment for each environmental topic) and Section 7 (EIA Process)
Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects.	Section 6 (Baseline Conditions and Scope of the Assessment for each environmental topic) and Section 7 (EIA Process)
Information Sources	
References to any guidance and best practice to be relied upon.	Section 6 (Scope of the Assessment for each environmental topic)
Evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities).	Section 7 (EIA Process-See Table 7-1)
An outline of the structure of the proposed ES.	Section 7 (EIA Process)

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

1.5 Structure of this Report

1.5.1 The remainder of this report is structured as follows:

- Section 2 – Description of the Existing Environment: provides a description of the site and the surrounding area, together with any particular potentially significant environmental sensitivities/receptors within the vicinity of the Proposed Development Site;
- Section 3 – Proposed Development: outlines the key elements (including those likely to have a significant environmental effect) of the Proposed Development, the infrastructure to be developed and the function of the operational plant;
- Section 4 – Consideration of Alternatives: details the alternatives that have been considered during development of the Proposed Development design;
- Section 5 – Planning Policy and Need: identifies the key documents relating to national and local planning policy in the area, together with a summary of some of the principal planning policies or provisions as relevant to the Proposed Development;
- Section 6 – Potentially Significant Environmental Effects: 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) and initial consideration of potential features of the Proposed Development or any measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment;
- Section 7 – Environmental Impact Assessment Process: provides an overview of the approach to be taken in the EIA and outline structure for the proposed ES; and
- Section 8– Summary and Matters to be Scoped Out: provides a summary of the EIA Scoping Report, the issues proposed to be scoped out of the EIA and the reasoning.

1.5.2 The following figures are included at Appendix A:

- Figure 1: Site Location Plan;
- Figure 2: Proposed Development Site Boundary (including location of Main Site A - Foundry);
- Figure 2a: Proposed Development Site Boundary (including location of Main Site B - RBT);
- Figure 3: Parts of the Proposed Development Site (Main Site A - Foundry);

- Figure 3a: Parts of the Proposed Development Site (Main Site B – RBT);
- Figure 4: CO₂ Export Corridor (Main Site A - Foundry);
- Figure 4a: CO₂ Export Corridor (extension required for Main Site B - RBT);
- Figure 5: Hydrogen Pipeline Corridor (Main Sites A - Foundry);
- Figure 5a: Hydrogen Pipeline Corridor (extension required for Main Site B - RBT)
- Figure 6: Natural Gas Connection Corridor (Main Site A – Foundry);
- Figure 6a: Natural Gas Connection Corridor (extension required for Main Site B – RBT);
- Figure 7: Electrical Connection Corridor (Main Site A – Foundry);
- Figure 7a: Electrical Connection Corridor (extension required for Main Site B – RBT);
- Figure 8: Water Connections Corridor (Main Site A – Foundry);
- Figure 8a: Water Connections Corridor (extension required for Main Site B – RBT);
- Figure 9: Other Gases Connection Corridor (O₂ and N₂) (Main Site A- Foundry);
- Figure 9a: Other Gases Connection Corridor (O₂ and N₂) (Main Site B- RBT);
- Figure 10: Environmental Constraints within 1 km of the Proposed Development Site Boundary;
- Figure 11: Water Constraints within 5 km of the Proposed Development Site Boundary;
- Figure 12: Ecological Constraints within 1 km of the Proposed Development Site Boundary;
- Figure 13: Statutory Designated Ecological Sites within 15 km of the Proposed Development Site Boundary;
- Figure 14: Major Accidents and Disasters Receptors within 5 km of the Proposed Development Site Boundary; and
- Figure 15: Other Developments to be Considered in the Cumulative Impact Assessment.

1.5.3 Any baseline data from other sources presented on Figures 1-15 in Appendix A is based on the information currently available from various data sources (see notes section on the individual Figures) and will be updated where required to inform the assessments as the EIA progresses.

2.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

2.1 The Proposed Development Site

2.1.1 The Main Site will be located either at 'The Foundry' site, within the Teesworks development site, or at RBT, to the immediate west of the Foundry.

2.1.2 The Proposed Development Site is located primarily within the administrative boundaries of Redcar and Cleveland Borough Council (RCBC) and Stockton-on-Tees Borough Council (STBC). The Hydrogen Pipeline Corridor extends further north-west to include land within the administrative boundary of Hartlepool Borough Council (HBC). For the purposes of this report, the Proposed Development Site is split into distinct areas. These are summarised below and illustrated on Figures 3-9 in Appendix A.

- The Main Site (whether Main Site A or B) which will be the location of the Production Facility together with the associated carbon capture and compression facilities and ancillary infrastructure.
- CO₂ Export Corridor: CO₂ captured from the process will be compressed to medium pressure at the Main Site and transported at a Maximum Allowable Operating Pressure (MAOP) of up to 28 barg¹ in a pipeline of up to 22" diameter to feed into the NEP CO₂ gathering system. CO₂ in dense-phase will then be exported off shore for geological storage offsite at the Endurance Store in the Southern North Sea using NEP infrastructure.
- Hydrogen Pipeline Corridor: Gaseous phase hydrogen pipeline network for the purpose of connecting to potential offtakers at various industrial installations across the Tees Valley. This pipeline system will be at up to 24" diameter and with a MAOP of up to 49 barg.
- Natural Gas Connection Corridor: Pipeline to connect the Production Facility to gas supply infrastructure.
- Other Gases Connection Corridor: Pipelines required for the transportation of compressed O₂ and N₂ from local sources for use in the H₂ production process.
- Electrical Connection Corridor: To provide electrical power for the Production Facility via a connection to the National Grid Network, either via private connection to Teesworks or to Northern Power Grid (NPG).
- Water Connections Corridor: Connections are required for water supply and discharge from/to the Production Facility.

¹ barg is the unit for the measurement of gauge pressure given by absolute pressure minus atmospheric pressure.

- 2.1.3 Further information regarding the above is provided in Section 3: The Proposed Development.
- 2.1.4 The Proposed Development Site encompasses an area of approximately 1,746 hectares (ha) and is indicative at this stage. The land required for the Proposed Development will be subject to appraisal, refinement, and final site selection as the preparation of the Application progresses. The final layout that will be incorporated within the Proposed DCO Boundary will be determined through ongoing studies of potential constraints and discussions with relevant stakeholders.
- 2.1.5 Any existing structures currently located within the Main Site A are expected to be demolished (by others under a separate consent) prior to commencement of works associated with the Proposed Development. As such, if Main Site A were to be selected, demolition works would not form part of the Proposed Development, and would not be assessed as part of the EIA.
- 2.1.6 There are structures present on Main Site B which would require demolition works. It is expected that these structures would be demolished (by others under a separate consent) prior to commencement of works associated with the Proposed Development, however, the Applicant may have to undertake these works. As such, if Main Site B were to be selected, demolition works would form part of the Proposed Development, and would be assessed as part of the EIA.

2.2 Site History

Main Site A – The Foundry

- 2.2.1 The history of Main Site A is summarised in Table 2-1.

Table 2-1: Main Site A History

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE A	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
1856-1857 (1:10,560)	The majority of Main Site A is underlain by Bran Sands in the West, associated with the River Tees and Tees Estuary.	Adjacent to Main Site A, the Darlington and Saltburn Branch railway line runs in a broadly north to south direction. The trainline then runs easterly to a village which in later maps is called Warrenby. The south Gare Breakwater runs in a spur north from Main Site A. Adjacent to the east is marshland and agricultural fields.
1859 -1861 (1:10,560)	No significant change.	No significant change, no data available for eastern extent.
1893 (1:10,560) (1:2,250)	Two tramways cross the northern portion of Main Site A. One originates at Redcar Jetty, travels in a north-western direction, and exits the Site to the south-east.	Redcar Jetty tramway leads into the adjacent Main Site B to the west and runs through its centre.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE A	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
	Another tramway crosses Redcar Jetty tramway and travels in a south-easterly direction. Both are understood to lead to an ironworks located adjacent to the eastern boundary of Main Site A.	
1895 & 1898 (1:10,560)	No significant change.	Numerous sidings adjacent east and north of Main Site A have been constructed associated with the Saltburn Branch railway line. A Coastguard Station and South Pier Lighthouse have been constructed on the South Gare Breakwater.
1915 (1:10,560) (1:2,250)	No significant change.	Mapping shows Coatham ironworks, located adjacent to the eastern boundary of Main Site A. Beyond that, to the east, is wider industrial development including a slag works, ironworks and tarmacadam works.
1920 & 1923 (1:10,560)	No significant change.	No significant change. Large portions of the mapping are missing.
1924 Ariel Photography	Photography shows industrial infrastructure in the north of the site, associated with the Redcar Iron and Steel works.	Coatham Ironworks extends beyond the eastern boundary of Main Site A. There is surface water and marshland either side of the jetty in Main Site B site, to the immediate west of Main Site A.
1929 OS Mapping	No significant change.	Coatham Ironworks is renamed Redcar Iron and Steel Works. The Slag and Tarmacadam expanded, along with the associated railway sidings to the north-east of Main Site A.
1930 (1:10,560)	No significant change.	A portion of the Redcar iron and steel works is shown to have been constructed. This can only be distinguished by moving forward in mapping time (1938).
1938 (1:10,560)	No significant change.	The sidings associated with the Saltburn Branch railway line now serve the constructed Redcar iron and steel works. To the east Dormanstown has been constructed, including a residential housing area with a sports ground and allotments.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE A	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
1946 Ariel Photography	Photography shows the industrial infrastructure associated with the steel works to still be present.	No significant change.
1951-1955 (1:10,000)	No significant change.	Dormanstown continues to expand, with further residential and industrial buildings built to the far east.
1970-1978 (1:10,000)	Railway infrastructure and road networks appear to have been constructed.	The Teesport refinery has been constructed approximately 1 km to the south of Main Site A.
1981 British Steel Corporation Site Layout Plan	Industrial infrastructure is present on-site including a blast furnace, two pumphouses, four oil tanks and butane and nitrogen storage compounds.	Area not shown by mapping.
1982 British Steel Corporation Site Layout Plan	In the north-east of Main Site A is a power station, blast furnace gasholder, coke screenhouse, settling pond and slag pits.	Area not shown by mapping.
1981-1985 (1:10,000)	The Redcar Steelworks has been constructed on site. Numerous buildings including tanks/ cooling towers and conveyors have been constructed.	The Saltburn Branch railway line has been realigned.
1986 (1:10,000)	No significant change.	A large reservoir/lake is located approximately 300 m south of Main Site A.
1991-1995 (1:10,000)	No significant change.	A series of square ponds have been constructed to the south of Main Site A.
1995 British Steel Corporation Site Layout Plan	The plan shows a blast furnace, water tanks, a thickener tank, a boiler house, slag pits and a cooling tower on Main Site A.	Area not shown by mapping.
1997 British Steel Corporation Site Layout Plan	Numerous tanks present.	Area not shown by mapping.
1999 Ariel Photography	No significant change.	The large reservoir/lake is still present, located approximately 300 m south of Main Site A.
2000 (Google Earth, 2023)	No significant change.	Within Main Site B, large stockpiles are present, as well as various buildings and a lorry park.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE A	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
2000-2021 (1:10,000)	No significant change.	Teesport refinery, located approximately 1 km to the south of Main Site A, appears to have been dismantled.
2015 Ariel Photography	Conveyors, tanks and other industrial infrastructure are in the north of Main Site A. There is surface water across Main Site A, and a pond in the north-east. Most of the infrastructure in the southern half of Main Site A is no longer present.	Two ponds are located approximately 30 m and 115 m north of Main Site A respectively.
2022 (Google Earth, 2023)	The majority of the southern half of Main Site A is vacant, with various small buildings present in the south western corner and conveyor structures remaining along the southern, eastern and western boundaries. Above-ground conveyors are still present in the northern and central parts of Main Site A. In the north, industrial infrastructure and tanks are still present, associated with the Redcar Steel works.	Large stockpiles are present on Main Site B, to the immediate west of Main Site A.
2023 (1:10,000)	Demolition of the buildings and infrastructure on Main Site A is ongoing.	Demolition of the buildings and infrastructure on Main Site B is ongoing.

Source: Envirocheck Report (284970768_1_1) (2021), Groundsure Report GS-9167761 (2022), Groundsure Report GS-9366847 (2023), National Library of Scotland (2023), Britain from Above (2023), Historic England (2015), Google Earth (2023).

Main Site B – RBT

2.2.2 The history of Main Site B is summarised in Table 2-2, below.

Table 2-2: Main Site B History

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE B	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
1857 (1:10,560)	Main Site B is located within the Bran Sands area.	The Tees estuary is located approximately 225 m west of Main Site B.
1893 (1:10,560) (1:2,250)	Redcar jetty tramway runs through the centre of Main Site B.	Redcar Wharf is located approximately 160 m southwest of Main Site B, where the Redcar Jetty tramway terminates. Several beacons and buoys are located in the Tees estuary, to the west of Main Site B.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE B	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
		Coatham Sands is located approximately 0.5 km to the north-east of Main Site B. Two tramways cross the northern portion of the Foundry site. One originates at Redcar Jetty, travels in a north-western direction, and exits the Site to the south-east. Another tramway crosses Redcar Jetty tramway and travels in a south-easterly direction. Both are understood to lead to an ironworks located approximately 1 km south-east of Main Site B.
1897 (1:10,560) (1:2,250)	No significant change.	Fifth Buoy Lighthouse is located approximately 500 m to the west of Main Site B.
1915 (1:10,560) (1:2,250)	No significant change.	A travelling crane is located at Redcar Wharf, approximately 160 m south-west of Main Site B. An ironworks (renamed Coatham ironworks) is located approximately 1.5 km east of Main Site B. Beyond that, approximately 1.7 km to the east, is wider industrial development including a slag works, ironworks and tarmacadam works.
1924 Aerial Photography	A jetty is located in the centre of Main Site B, with surface water and marshland on either side.	Various other railways/ tramways split off from the original tramway and appear to lead into a large building adjacent to the eastern boundary of Main Site B. A slag and tarmacadam works, and Warrenby slag works, are located to the north-east of Main Site B alongside a reservoir and a pumping station.
1927 – 1929 OS Mapping	No significant change.	Coatham Ironworks located approximately 1.5 km to the east (renamed Redcar Iron and Steel works) expanded, along with associated railway sidings to the north-east. Numerous tanks, sidings, railways lines, buildings, water towers and metre house are related to the iron and steel works are present. A sand pit is located approximately 400 m east of Main Site B.
1929 (1:10,560) (1:2,250)	No significant change.	Another travelling crane is located at Redcar Wharf, approximately 160 m south-west of Main Site B.
1938 OS Mapping	No significant change.	No significant change.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE B	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
1944 Aerial Photography	Main Site B comprised possible sand/ marshland in the north and south, separated by the jetty and tramway.	Various buildings associated with the slag works are present to the east of Main Site B.
1952 OS Mapping	No significant change.	Six tanks are located approximately 1 km to the south-east of Main Site B. There are numerous drains and ponds along the eastern boundary of the adjacent Foundry site (Main Site A), within marshland, and a pumping station is situated from approximately 1 km to the north-east of Main Site B.
1953 OS Mapping	No significant change.	Two slag heaps were identified adjacent to the north-east corner of the Foundry site and a saltmarsh is located along the eastern boundary of the Foundry site.
1954 (1:10,560) (1:2,250)	Two small buildings are located along Redcar jetty, in the centre of Main Site B. Significant development of the steelworks occurred in the northeast of Main Site B, adjacent to Redcar Jetty, and numerous roadways, ramps, buildings, two conveyors, a platform, and a separator were constructed.	Buildings, roadways and ramps lead from the iron and steel works into Main Site B from the east.
1968 (1:10,560) (1:2,250)	No significant change.	A dismantled tramway is located approximately 600 m to the east of Main Site B. A spoil heap is situated approximately 100 m to the north-east of Main Site B.
1972 OS Mapping	Site not shown by mapping.	To the south of Main Site B, the wider area is referred to as South Teesside Works, Redcar. Active workings are shown to the south-east and a railway line runs parallel to the southern boundary of Main Site B.
1980 (1:10,000) (1:2,250)	Main Site B is now shown as constructed on reclaimed land adjacent to the wider Redcar Steelworks. Numerous lighting towers are	Redcar Wharf, located approximately 160 m south-west of Main Site B, expanded. Numerous conveyors, lighting towers and travelling cranes were constructed in the immediate vicinity.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE B	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
	located within it. Seven conveyors stretch across the central and southern areas of it.	The main Redcar Steelworks is located to the immediate east of Main Site B, which includes numerous embankments, conveyors, tanks, travelling cranes, chimneys and buildings. An terminal containing numerous tanks, jetties and a laboratory is located approximately 700 m south-west of Main Site B, on the northern bank of the Tees estuary.
1981 British Steel Corporation Site Layout Plan	Site not shown by mapping.	To the east of Main Site B, within the Foundry site, there is a blast furnace, two pumphouses, four oil tanks and butane and nitrogen storage compounds.
1982 British Steel Corporation Site Layout Plan	Site not shown by mapping.	To the north east of the adjacent Foundry site, there is a power station, blast furnace gasholder, coke screenhouse, settling pond and slag pits.
1993 (1:10,000) (1:2,500)	No significant change.	A pipe tunnel runs from Dabholm Gut, located approximately 700 m south of Main Site B, across the Tees estuary, to the oil terminal/ refinery on its northern bank. Minor expansions to Teesworks were undertaken to the east of Main Site B.
1995 British Steel Corporation Site Layout Plan	Site not shown by mapping.	To the east of Main Site B, within the adjacent Foundry site, there is a blast furnace, as well as water tanks, a thickener tank, a boiler house, slag pits and a cooling tower.
1997 British Steel Corporation Site Layout Plan	Site not shown by mapping.	The Foundry North, adjacent to Main Site B, included numerous tanks.
1999 (Aerial photograph)	Development occurred in the north of Main Site B, including possible stockpiling.	A large reservoir/ lake is located approximately 300 m south of Main Site B.
2000 (Google Earth, 2023)	Main Site B comprised large stockpiles in the north, with various buildings still present, and a possible lorry park. Stockpiles are present in the southern half of Main Site B.	No significant change.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE B	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
2001 (1:10,000)	A small pond/ lake is present in north-western corner of Main Site B.	A tip is located approximately 650 m north-east of Main Site B, near a group of small ponds. Various tanks and buildings are located approximately 700 m south of Main Site B, associated with an oil refinery.
2007 (Aerial Photography)	No significant change.	No significant change.
2010 (1:10,000)	Three small buildings were constructed in the centre of Main Site B.	Small expansions were undertaken to Teesworks, east of Main Site B, including the construction of roadways. The oil refinery located approximately 700 m south-east of Main Site B also expanded, including the construction of new tanks and two new pipelines. A tip is located approximately 500 m to the north of Main Site B, within Coatham Dunes, close to eight small ponds.
2015 (Aerial Photography)	No significant changes shown on Groundsure Aerial photography, which covers the south of Main Site B. Aerial photography shows that large coal and ore stockpiles and above-ground conveyor structures that extend across the whole of Main Site B are still present. There is a small pond in the north-western corner of Main Site B, within a large, roughly vegetated area. The majority of Main Site B is covered with large puddles and surface water. The railway line through the centre of Main Site B appears to be abandoned. The buildings on-site are still present.	Redcar Steelworks appears to no longer be in use. Various industrial developments are present adjacent to the River Tees, to the west of Main Site B, with nearby cars suggesting that they are in-use.
2019 (Aerial photograph)	No significant change.	No significant change.
2021 (Aerial photograph)	No significant change.	No significant change.

MAP EDITION(S)	SIGNIFICANT FEATURES ON MAIN SITE B	SIGNIFICANT FEATURES IN THE SURROUNDING AREA
2022 (Google Earth, 2023)	Main Site B comprised various large stockpiles, conveyors and associated structures. The small pond is still present in the north-west of Main Site B. This is understood to be representative of the current site layout.	The pond adjacent to the north-east corner of Main Site B is no longer present.
2023 (1:10,000)	Demolition of conveyors and buildings on Main Site B is ongoing.	Demolition works are ongoing in the area surrounding Main Site B.

Sources: *Groundsure Report GS-9167761 (2022)*, *Groundsure Report GS-9366847 (2023)*, *National Library of Scotland (2023)*, *Britain from Above (2023)*, *Historic England (2015)*, *Google Earth (2023)*.

2.3 Environmental Receptors

2.3.1 Several environmental receptors have been identified within the vicinity of the Proposed Development Site (pursuant to study areas discussed in section 6). Each of these are detailed below under each environmental discipline (note this is not intended to be an exhaustive list at this stage) and further detail where required is presented in the topic sections included within Section 6: Potentially Significant Environmental Effects. All distances are given as the shortest distance between the receptor and the closest point of the relevant part of the Proposed Development Site (see Figures 3-13, Appendix A).

Main Site A – Foundry

2.3.2 Main Site A comprises approximately 91 ha of land. It is not anticipated that all of this land will be required but it is presented as a worst-case scenario area until the layout of the Proposed Development is confirmed within this area.

2.3.3 Main Site A comprises former industrial land that was used for steel making production, including a mix of industrial buildings. As of February 2023, much of the site infrastructure including industrial buildings and overhead pipes are either demolished or in the process of being dismantled. A combination of hardstanding and road networks remain on Main Site A, surrounded by informal vegetation (primarily grass), with occasional shrubs and small trees.

2.3.4 The topography of Main Site A is relatively flat, with typical ground levels of between 6-8 m above ordnance datum (AOD).

2.3.5 The following environmental receptors have been identified in the vicinity of Main Site A.

Residential

-
- 2.3.6 Main Site A is generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 1.3 km east of Main Site A, in Warrenby.
- 2.3.7 Dormanstown is located approximately 1.3 km to the south-east of Main Site A, and Redcar is located approximately 2.6 km to the east of Main Site A.

Traffic and Transport

- 2.3.8 Access to Main Site A during the construction phase for Heavy Goods Vehicle (HGV) construction traffic is likely to be via the existing Teesworks access road from the A1085, via the former Redcar Steelworks entrance. This route will also be used during operation for staff and other site traffic.
- 2.3.9 The Tees Valley Line, a passenger railway, runs approximately 0.9 km south-east of Main Site A. The mothballed Redcar British Steel railway station is located approximately 1.2 km south-west of Main Site A.
- 2.3.10 There are no Public Rights of Way (PRoWs) within Main Site A. The England Coast Path, a National Trail, runs approximately 1.3 km east of Main Site A. The Teesdale Way Long Distance Route runs adjacent to Main Site A along its northern boundary. There are no other National Trails within 5 km of Main Site A.
- 2.3.11 Whilst Main Site A is located within access land in the England Coastal Margin defined by the Countryside and Rights of Way (CRoW) Act (2000), public access for industrial areas in South Tees is currently restricted under the CRoW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

- 2.3.12 Within 15 km of Main Site A there are:
- Three Special Protection Areas (SPAs):
 - Teesmouth and Cleveland Coast SPA, immediately north of Main Site A;
 - North York Moors SPA, located approximately 12.2 km south-east of Main Site A; and
 - Northumbria Coast SPA, located approximately 13.5 km north-west of Main Site A.
 - Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site, immediately north of Main Site A; and
 - Northumbria Coast Ramsar Site, located approximately 13.5 km north-west of Main Site A.
 - Two Special Areas of Conservation (SACs):

- North York Moors SAC, located approximately 12.2 km south-east of Main Site A; and
 - Durham Coast SAC, located approximately 13.5 km north-west of Main Site A.
 - Two National Nature Reserves (NNRs):
 - Teesmouth NNR, located approximately 1.6 km west of Main Site A; and
 - Durham Coast NNR, located approximately 12.5 km north-west of Main Site A.
- 2.3.13 There are no proposed Ramsar Sites or potential SPAs within 15 km of Main Site A.
- 2.3.14 There is one Site of Special Scientific Interest (SSSI) within 5 km of Main Site A, that being Teesmouth and Cleveland Coast SSSI, adjacent to Main Site A.
- 2.3.15 There is one Local Nature Reserve (LNR) within 5 km of Main Site A, that being Seaton Dunes and Common LNR, located approximately 3.1 km north-west of Main Site A.
- Hydrology/Flood Risk**
- 2.3.16 The River Tees (a Main River) discharges to the North Sea via the Tees Estuary at Tees Mouth and is located approximately 0.9 km west of Main Site A. Other watercourses within 1km of Main Site A include:
- Dabholm Gut², a man-made tidal inlet, located approximately 0.7km south of Main Site A;
 - The Fleet, located approximately 0.8 km east of Main Site A; and
 - The Mill Race, located approximately 0.9 km south-east of Main Site A.
- 2.3.17 The Environment Agency 'Flood map for planning' indicates that the whole of Main Site A is located within Flood Zone 1 that is defined as, "*land having a less than 0.1% annual exceedance probability (AEP) of river or sea flooding*".
- Geology and Hydrogeology**
- 2.3.18 Main Site A 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.
- 2.3.19 Main Site A is located over 5 km south-east of the nearest aquifer Source Protection Zone (SPZ). There are no Nitrate Vulnerable Zones (NVZs), Drinking Water Protected

² Also referenced on early mapping sources as Dabholm Cut. For the purposes of this report, this watercourse/feature will be referred to consistently as Dabholm Gut. It is fed by a combined discharge from number of watercourses and the permitted discharge from Bran Sands WwTW.

Areas, Drinking Water Safeguard Zones (Surface Water and Groundwater) or groundwater, potable water or surface water abstraction licences located within 1 km of Main Site A.

Cultural Heritage

- 2.3.20 There are no designated heritage assets within Main Site A.
- 2.3.21 There are 59 listed buildings within 5 km of Main Site A. The closest are three Grade II listed buildings (Marsh Farmhouse and Farm Cottage, 'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of Marsh Farmhouse'), located approximately 1.3 km east of Main Site A, at Warrenby.
- 2.3.22 There are four Conservation Areas within 5 km of Main Site A:
- Coatham Conservation Area, Redcar, located approximately 2.5 km east of Main Site A;
 - Kirkleatham Conservation Area, located approximately 3.8 km south-east of Main Site A;
 - Seaton Conservation Area, located approximately 4.6 km north-west of Main Site A; and
 - Wilton Conservation Area, located approximately 5 km south-east of Main Site A.
- 2.3.23 There are no scheduled monuments, world heritage sites, registered parks and gardens, registered battlefields or heritage coasts within 5 km of Main Site A.

Landscape

- 2.3.24 Main Site A is located within the Tees Lowlands National Character Area (NCA).
- 2.3.25 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including Main Site A and the surrounding area.

Main Site B – RBT

- 2.3.26 Main Site B comprises approximately 60 ha of land. It is not anticipated that all of this land will be required but it is presented as a worst-case scenario area until the layout of the Proposed Development is confirmed within this area.
- 2.3.27 Main Site B comprises former industrial land, including a mix of industrial buildings and some small areas of grassland. Much of the site infrastructure is still in place, including hardstanding and road networks.
- 2.3.28 The topography of Main Site B is relatively flat, with typical ground levels of approximately 2-7 m AOD. Ground levels for the majority of Main Site B are approximately 5-7 m AOD; the north-western corner of Main Site B is lower at approximately 2 m AOD.
- 2.3.29 The following environmental receptors have been identified in the vicinity of Main Site B.

Residential

2.3.30 Main Site B is generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 2.2 km east of Main Site B in Warrenby.

2.3.31 Dormanstown is located approximately 3 km to the south-east of Main Site B, and Redcar is located approximately 4.2 km to the east of Main Site B.

Traffic and Transport

2.3.32 Access to Main Site B during the construction phase for HGV construction traffic is likely to be the same as that for Main Site A, i.e. via the existing access road from the A1085, via the former Redcar Steelworks entrance. This route will also be used during operation for staff and other site traffic.

2.3.33 The Tees Valley Line railway runs approximately 1.8 km south-east of Main Site B. The mothballed Redcar British Steel railway station is located approximately 2.1 km south-west of Main Site B.

2.3.34 There are no PRowS within Main Site B. The Teesdale Way long distance route runs approximately 0.4 km north-east of Main Site B. The England Coast Path National Trail runs approximately 2.2 km east of Main Site B. There are no other National Trails within 5 km of Main Site B.

2.3.35 Whilst Main Site B is located within access land in the England Coastal Margin defined by the CRoW Act (2000), public access for industrial areas in South Tees is currently restricted under the CRoW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

2.3.36 Within 15 km of Main Site B there are:

- Three Special Protection Areas (SPAs):
 - Teesmouth and Cleveland Coast SPA, adjacent to Main Site B;
 - North York Moors SPA, located approximately 12.7 km south-east of Main Site B; and
 - Northumbria Coast SPA, located approximately 13.1 km north-west of Main Site B.
- Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site adjacent to Main Site B; and
 - Northumbria Coast Ramsar Site, located approximately 13.1 km north-west of Main Site B.
- Two Special Areas of Conservation (SACs):
 - North York Moors SAC, located approximately 12.7 km south-east of Main Site B; and

-
- Durham Coast SAC, located approximately 13.1 km north-west of Main Site B.
 - Two National Nature Reserves (NNRs):
 - Teesmouth NNR, located approximately 0.8 km west of Main Site B; and
 - Durham Coast NNR, located approximately 12 km north-west of Main Site B.
- 2.3.37 There are no proposed Ramsar Sites or potential SPAs within 15 km of Main Site B.
- 2.3.38 There is one SSSI within 5 km of Main Site B, that being Teesmouth and Cleveland Coast SSSI, adjacent to Main Site B.
- 2.3.39 There is one LNR within 5 km of Main Site B, that being Seaton Dunes and Common LNR, located approximately 2.3 km north-west of Main Site B.
- Hydrology/ Flood Risk**
- 2.3.40 The River Tees (Tees Estuary) at Tees Mouth is located approximately 75 m west of Main Site B at its closest point. Other watercourses within 1 km of Main Site B include:
- Dabholm Gut, located approximately 0.88 km south of Main Site B;
 - The Fleet, located approximately 1.7 km east of Main Site B; and
 - The Mill Race, located approximately 2.0 km south-east of Main Site B.
- 2.3.41 The Environment Agency 'Flood map for planning' indicates that the whole of Main Site B is located within Flood Zone 1 that is defined as, "*land having a less than 0.1% annual exceedance probability (AEP) of river or sea flooding*".
- Geology and Hydrogeology**
- 2.3.42 Main Site B is underlain by a sequence of Made Ground, Tidal Flat Deposits, Glacial Till (Boulder Clay)/Glacio-lacustrine Deposits underlain by the Triassic Mercia Mudstone Group bedrock.
- 2.3.43 Main Site B is located over 5 km south-east of the nearest SPZ. There are no NVZs, Drinking Water Protected Areas, Drinking Water Safeguard Zones (Surface Water and Groundwater) or groundwater, potable water or surface water abstraction licences located within 1 km of Main Site B.
- Cultural Heritage**
- 2.3.44 There are no designated heritage assets within Main Site B.
- 2.3.45 There are 40 listed buildings within 5 km of Main Site B. The closest are three Grade II listed buildings (Marsh Farmhouse and Farm Cottage, 'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of Marsh Farmhouse'), located approximately 2.2 km east of Main Site B in Warrenby.
- 2.3.46 There are three Conservation Areas within 5 km of Main Site B:
-

- Coatham Conservation Area, Redcar, located approximately 3.3 km east of Main Site B;
- Seaton Conservation Area, located approximately 3.9 km north-west of Main Site B; and
- Kirkleatham Conservation Area, located approximately 4.7 km south-east of Main Site B.

2.3.47 There are no scheduled monuments, world heritage sites, registered parks and gardens, registered battlefields or heritage coasts within 5 km of Main Site B.

Landscape

2.3.48 Main Site B is located within the Tees Lowlands NCA.

2.3.49 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including Main Site B and the surrounding area.

CO₂ Export Corridor – Main Site A

2.3.50 There are two CO₂ Export Corridor options for Main Site A; only one will be required.

2.3.51 The first CO₂ Export Corridor is adjacent to Main Site A and links to NEP infrastructure on the adjacent NZT site. It comprises approximately 4 ha at present, but this will be refined in due course.

2.3.52 An alternative CO₂ Export Corridor option would connect into Main Site A at a location along its southern boundary and then route to the south of the NZT site. Part of this corridor is also being considered as an option for Main Site B. It comprises approximately 11 ha at present, but this will also be subject to refinement if carried forward as the preferred option. The following environmental receptors have been identified in the vicinity of the CO₂ Export Corridors for Main Site A.

Residential

2.3.53 The CO₂ Export Corridors are generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 0.8 km east of the CO₂ Export Corridors in Warrenby.

2.3.54 Dormanstown is located approximately 1.1 km to the south-east of the CO₂ Export Corridors, and Redcar is located approximately 2.4 km to the-east of the CO₂ Export Corridors.

Traffic and Transport

2.3.55 The Tees Valley railway line runs approximately 0.5 km south-east of the CO₂ Export Corridors.

2.3.56 There are no PRoWs within or adjacent to the CO₂ Export Corridors. The Teesdale Way runs approximately 0.5 km north-east of the CO₂ Export Corridors. The England Coast Path runs approximately 0.8 km north-east of the CO₂ Export Corridors. There are no other National Trails within 5 km of the CO₂ Export Corridors.

2.3.57 Whilst the CO₂ Export Corridors are located within access land in the England Coastal Margin defined by the CRoW Act (2000), public access for industrial areas in South

Tees is currently restricted under the CROW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

2.3.58 Within 15 km of the CO₂ Export Corridors there are:

- Three SPAs:
 - Teesmouth and Cleveland Coast SPA, approximately 0.5 km north of the CO₂ Export Corridors;
 - North York Moors SPA, located approximately 11.7 km south-east of the CO₂ Export Corridors; and
 - Northumbria Coast SPA, located approximately 14.6 km north-west of the CO₂ Export Corridors.
- Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site, located approximately 0.5 km north of the CO₂ Export Corridors; and
 - Northumbria Coast Ramsar Site, located approximately 14.6 km north-west of the CO₂ Export Corridors.
- Two SACs:
 - North York Moors SAC, located approximately 11.6 km south-east of the CO₂ Export Corridors; and
 - Durham Coast SAC, located approximately 14.6 km north-west of the CO₂ Export Corridors.
- Two NNRs:
 - Teesmouth NNR, located approximately 2.7 km west of the CO₂ Export Corridors; and
 - Durham Coast NNR, located approximately 13.6 km north-west of the CO₂ Export Corridors.

2.3.59 There are no proposed Ramsar Sites or potential SPAs within 15 km of the CO₂ Export Corridors.

2.3.60 There is one SSSI within 5 km of the CO₂ Export Corridors, Teesmouth and Cleveland Coast SSSI, located approximately 0.5 m north of the CO₂ Export Corridors.

2.3.61 There is one LNR within 5 km of the CO₂ Export Corridors, Seaton Dunes and Common LNR, located approximately 3.8 km north-west of the CO₂ Export Corridors.

Hydrology/ Flood Risk

2.3.62 The Tees Estuary at Tees Mouth is located approximately 1.8 km west of the CO₂ Export Corridors. Other watercourses within 1 km of the CO₂ Export Corridors include:

- The Fleet, located approximately 80 m east of the CO₂ Export Corridors;
- The Mill Race, located approximately 0.4 km south-east of the CO₂ Export Corridors;
- Ash Gill, located approximately 0.5 km south-east of the CO₂ Export Corridors;
- Dabholm Gut, located approximately 0.8 km south of the CO₂ Export Corridors; and
- Dabholm Beck, located approximately 0.9 km south of the CO₂ Export Corridors.

2.3.63 The Environment Agency 'Flood map for planning' indicates that the CO₂ Export Corridors are wholly located within Flood Zone 1 that is defined as, "*land having a less than 0.1% AEP of river or sea flooding*".

Geology and Hydrogeology

2.3.64 A review of the publicly available British Geological Survey (BGS) borehole records and geological maps (BGS, 2022) indicate that the CO₂ Export Corridors are underlain by a sequence of Made Ground, Tidal Flat Deposits and mudstones of the Redcar Mudstone Formation.

2.3.65 There are no SPZs, NVZs, Drinking Water Protected Areas, Drinking Water Safeguard Zones (Surface Water and Groundwater) or groundwater, potable water or surface water abstraction licences within 1 km of the CO₂ Export Corridors.

Cultural Heritage

2.3.66 There are no designated heritage assets within the CO₂ Export Corridors.

2.3.67 There are 83 listed buildings within 5 km of the CO₂ Export Corridors. The closest are three Grade II listed buildings (Marsh Farmhouse and Farm Cottage, 'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of Marsh Farmhouse'), located approximately 0.8 km east of the CO₂ Export Corridors in Warrenby.

2.3.68 There are four Conservation Areas within 5 km of the CO₂ Export Corridors:

- Coatham Conservation Area, Redcar, located approximately 1.9 km east of the CO₂ Export Corridors;
- Kirkleatham Conservation Area, located approximately 3.1 km south-east of the CO₂ Export Corridors;
- Wilton Conservation Area, located approximately 4.4 km south-east of the CO₂ Export Corridors; and
- Yearby Conservation Area, located approximately 4.4 km south-east of the CO₂ Export Corridors.

2.3.69 There is one scheduled monument within 5km of the CO₂ Export Corridors, a 'World War I early warning acoustic mirror 650m north west of Bridge Farm', located approximately 4.7 km south-east of the CO₂ Export Corridors in Redcar.

2.3.70 There are no world heritage sites, registered parks and gardens, registered battlefields or heritage coasts within 5 km of the CO₂ Export Corridors.

Landscape

2.3.71 The CO₂ Export Corridors are located within the Tees Lowlands NCA.

2.3.72 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including the CO₂ Export Corridors and the surrounding area.

Hydrogen Pipeline Corridor – Main Site A

2.3.73 The Hydrogen Pipeline Corridor connects Main Site A to potential offtakers at various industrial installations across the Tees Valley. It currently comprises approximately 1,306 ha of predominantly industrial land, from Billingham in the west to Kirkleatham in the east and includes a crossing of the Tees. However, the land required for the construction and operation of the hydrogen pipeline network will be of much smaller area than this and the corridor will be refined during design work prior to submission of the Application. Refer to Section 3.5 for further detail.

2.3.74 The following environmental receptors have been identified in the vicinity of the Hydrogen Pipeline Corridor.

Residential

2.3.75 The Hydrogen Pipeline Corridor is predominantly located within industrial land, and as such, is generally remote from residential receptors. Near to Main Site A, the Hydrogen Pipeline Corridor is close to Dormanstown and Redcar. Dormanstown is located approximately 0.2 km to the east of the Hydrogen Pipeline Corridor, and Redcar is located approximately 2.2 km to the north-east of the Hydrogen Pipeline Corridor.

2.3.76 Where the Hydrogen Pipeline Corridor extends into the Wilton International Estate, it is approximately 0.4 km to the west of Kirkleatham.

2.3.77 At its western extent, the Hydrogen Pipeline Corridor is approximately 1.2 km north-east of Billingham and 0.5 km east of Wolviston. There is a small group of properties located approximately 50 m south of the Hydrogen Pipeline Corridor on Cowpen Lane, near Cowpen Bewley.

Traffic and Transport

2.3.78 The Tees Valley Line and Durham Coast railway lines run through the Hydrogen Pipeline Connection Corridor. The A1085 Trunk Road, Tees Dock Road, Seaton Carew Road, Tees Road and Haverton Hill Road also pass through the Hydrogen Pipeline Connection Corridor.

2.3.79 15 PRoWs are located within the Hydrogen Pipeline Corridor (12 of which are footpaths and three of which are bridleways). Some of these PRoWs form part of the

England Coast Path National Trail and the Teesdale Way long distance route. There are no other National Trails within 5 km of the Hydrogen Pipeline Corridor.

- 2.3.80 Whilst some of the Hydrogen Pipeline Corridor is located within access land in the England Coastal Margin defined by the CRoW Act (2000), public access for industrial areas in South Tees is currently restricted under the CRoW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

- 2.3.81 Within 15 km of the Hydrogen Pipeline Corridor there are:

- Three SPAs:
 - Teesmouth and Cleveland Coast SPA, part of which falls within the Hydrogen Pipeline Corridor;
 - North York Moors SPA, located approximately 7.9 km south-east of the Hydrogen Pipeline Corridor; and
 - Northumbria Coast SPA, located approximately 10 km north-west of the Hydrogen Pipeline Corridor.
- Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site, part of which falls within the Hydrogen Pipeline Corridor; and
 - Northumbria Coast Ramsar Site, located approximately 10.5 km north-west of the Hydrogen Pipeline Corridor.
- Three SACs:
 - North York Moors SAC, located approximately 8 km south-east of the Hydrogen Pipeline Corridor;
 - Durham Coast SAC, located approximately 10.5 km north-west of the Hydrogen Pipeline Corridor; and
 - Castle Eden Dene SAC, located approximately 13.5 km north-west of the Hydrogen Pipeline Corridor.
- Three NNRs:
 - Teesmouth NNR, some of which falls within the Hydrogen Pipeline Corridor;
 - Durham Coast NNR, located approximately 9.5 km north-west of the Hydrogen Pipeline Corridor; and

- Castle Dene NNR, located approximately 13.5 km north-west of the Hydrogen Pipeline Corridor.

2.3.82 There are no proposed Ramsar Sites or potential SPAs within 15 km of the Hydrogen Pipeline Corridor.

2.3.83 There are two SSSIs within 5 km of the Hydrogen Pipeline Corridor:

- Teesmouth and Cleveland Coast SSSI, some of which is located within the Hydrogen Pipeline Corridor; and
- Lovell Hill Pools SSSI, located approximately 2.4 km south-east of the Hydrogen Pipeline Corridor.

2.3.84 There are 13 LNRs within 5 km of the Hydrogen Pipeline Corridor:

- Cowpen Bewley Woodland Country Park LNR, part of which is located within the Hydrogen Pipeline Corridor;
- Charlton's Pond LNR, located approximately 0.5 km west of the Hydrogen Pipeline Corridor;
- Seaton Dunes and Common LNR, located approximately 1.3 km north-east of the Hydrogen Pipeline Corridor;
- Billingham Beck Valley LNR, located approximately 1.4 km west of the Hydrogen Pipeline Corridor;
- Greatham Beck LNR, located approximately 1.8 km north-west of the Hydrogen Pipeline Corridor;
- Eston Moor LNR, located approximately 2.4 km south of the Hydrogen Pipeline Corridor;
- Linthorpe Cemetery LNR, located approximately 2.3 km south of the Hydrogen Pipeline Corridor;
- Norton Grange Marsh LNR, located approximately 2.8 km south-west of the Hydrogen Pipeline Corridor;
- Errington Wood LNR, located approximately 3.3 km west of the Hydrogen Pipeline Corridor;
- Berwick Hills LNR, located approximately 3.8 km south of the Hydrogen Pipeline Corridor;
- Flatts Lane Woodland Country Park LNR, located approximately 4.2 km south of the Hydrogen Pipeline Corridor;
- Summerhill LNR, located approximately 4 km north-west of the Hydrogen Pipeline Corridor; and
- Hardwick Dene & Elm Tree Woods LNR, located approximately 4.6 km south-west of the Hydrogen Pipeline Corridor.

Hydrology/ Flood Risk

2.3.85 The Hydrogen Pipeline Corridor crosses the River Tees. There are 20 other named watercourses within 1 km of the Hydrogen Pipeline Corridor:

- Claxton Beck, Seaton on Tees Channel, Knitting Wife Beck, Dabholm Gut, Holme Fleet, Greatham Creek, Mains Dike, Swallow Fleet, Dabholm Beck, Greatham Beck, Belasis Beck, Castle Gill, the Fleet, the Mill Race, all of which are partially or wholly located within the Hydrogen Pipeline Corridor;
- Ash Gill, located approximately 30 m east of the Hydrogen Pipeline Corridor;
- Cowbridge Beck, located approximately 160 m west of the Hydrogen Pipeline Corridor;
- Billingham Beck, located approximately 570 m south-west of the Hydrogen Pipeline Corridor;
- Kinkerdale Beck, located approximately 600 m south-west of the Hydrogen Pipeline Corridor; and
- Kettle Beck, located approximately 860 m south-west of the Hydrogen Pipeline Corridor.

2.3.86 The Environment Agency 'Flood map for planning' indicates that approximately half of the Hydrogen Pipeline Corridor is located within Flood Zone 1 that is defined as, "*land having a less than 0.1% AEP of river or sea flooding*", whilst the remaining land falls within Flood Zones 2 (between 0.1% and 1% AEP river flooding and between 0.1% and 0.5% AEP sea flooding) and 3 (greater than 1% AEP river flooding and greater than 0.5% AEP sea flooding). The areas of Flood Zones 2 and 3 are around the Tees and Dabholm Gut, and to the north of the Tees, as illustrated on Figure 11: Water Constraints within 5 km of the Proposed Development Site Boundary (Appendix A).

Geology and Hydrogeology

2.3.87 The Hydrogen Pipeline Corridor is variably underlain by a sequence of Made Ground, Tidal Flat Deposits, Alluvium (Clay, Silt, Sand and Gravel), Blown Sand, Devensian Glaciolacustrine Deposits (Clay and Silt) and Devensian Glacial Till (Boulder Clay). The superficial deposits are underlain by the Triassic Sherwood Sandstone Group in the western area of the Hydrogen Pipeline Corridor. The eastern area is underlain by mudstones from the Triassic Mercia Mudstone Group and Penarth Formation and the Jurassic Redcar Mudstone Formation.

2.3.88 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Hydrogen Pipeline Corridor. A small part of the Hydrogen Pipeline Corridor, in Billingham, falls within a NVZ.

Cultural Heritage

2.3.89 There are no designated heritage assets within the Hydrogen Pipeline Corridor.

2.3.90 There are 488 listed buildings within 5 km of the Hydrogen Pipeline Corridor. The closest are Grade II Village Farmhouse, Billingham, located approximately 70 m south

of the Hydrogen Pipeline Corridor, and Grade II* 'Phosphate rock silo number 15 at ICI works, Billingham', located approximately 260 m south of the Hydrogen Pipeline Corridor.

- 2.3.91 There are 21 Conservation Areas within 5 km of the Hydrogen Pipeline Corridor, the closest of which are Cowpen Bewley Conservation Area, part of which falls within the Hydrogen Pipeline Corridor, and Kirkleatham Conservation Area, located approximately 150 m east of the Hydrogen Pipeline Corridor.
- 2.3.92 There are 25 scheduled monuments within 5 km of the Hydrogen Pipeline Corridor, the closest of which are Claxton medieval moated site, 'Bowl barrow 1.1 km north-west of High Court Green' and 'Eston Nab hill fort, palisaded settlement and beacon'. Claxton medieval moated site is located approximately 2 km north-west of the Hydrogen Pipeline Corridor. 'Bowl barrow 1.1 km north-west of High Court Green' and 'Eston Nab hill fort, palisaded settlement and beacon' are located approximately 2.4 km south of the Hydrogen Pipeline Corridor.
- 2.3.93 There are two registered parks and gardens within 5 km of the Hydrogen Pipeline Corridor: Grade II Albert Park, located approximately 2.7 km south-east of the Hydrogen Pipeline Corridor in Middlesborough, and Grade II* Ropner Park, located approximately 4.7 km south-east of the Hydrogen Pipeline Corridor in Stockton-on-Tees.
- 2.3.94 There are no world heritage sites, registered battlefields or heritage coasts within 5 km of the Hydrogen Pipeline Corridor.

Landscape

- 2.3.95 The Hydrogen Pipeline Corridor is located within the Tees Lowlands NCA.
- 2.3.96 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including the Hydrogen Pipeline Corridor and the surrounding area.

Natural Gas Connection Corridor – Main Site A

- 2.3.97 The identified indicative Natural Gas Connection Corridor comprises approximately 11 ha of industrial land connecting the Production Facility to the wider gas supply infrastructure in the area. However, the land required for the Natural Gas Connection Corridor will be refined during design work prior to submission of the Application. Refer to Section 3.4 for further detail.
- 2.3.98 The following environmental receptors have been identified in the vicinity of the Natural Gas Connection Corridor.

Residential

- 2.3.99 The Natural Gas Connection Corridor is generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 0.8 km north-east of the Natural Gas Connection Corridor in Warrenby.
- 2.3.100 Dormanstown is located approximately 1.1 km to the south-east of the Natural Gas Connection Corridor, and Redcar is located approximately 2.5 km to the east of the Natural Gas Connection Corridor.

Traffic and Transport

- 2.3.101 The Tees Valley Line railway runs approximately 0.5 km south-east of the Natural Gas Connection Corridor.
- 2.3.102 There are no PRoWs within or adjacent to the Natural Gas Connection Corridor. The Teesdale Way long distance route runs approximately 0.5 km north-east of the Natural Gas Connection Corridor. The England Coast Path National Trail runs approximately 0.8 km north-east of the Natural Gas Connection Corridor. There are no other National Trails within 5 km of the Natural Gas Connection Corridor.
- 2.3.103 Whilst the Natural Gas Connection Corridor is located within access land in the England Coastal Margin defined by the CRoW Act (2000), public access for industrial areas in South Tees is currently restricted under the CRoW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

- 2.3.104 Within 15 km of the Natural Gas Connection Corridor there are:
- Three SPAs:
 - Teesmouth and Cleveland Coast SPA, located approximately 0.7 km south and 1 km north of the Natural Gas Connection Corridor;
 - North York Moors SPA, located approximately 11.7 km south-east of the Natural Gas Connection Corridor; and
 - Northumbria Coast SPA, located approximately 14.9 km north-west of the Natural Gas Connection Corridor.
 - Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site, located approximately 0.7 km north of the Natural Gas Connection Corridor; and
 - Northumbria Coast Ramsar Site, located approximately 14.9 km north-west of the Natural Gas Connection Corridor.
 - Two SACs:
 - North York Moors SAC, located approximately 11.7 km south-east of the Natural Gas Connection Corridor; and
 - Durham Coast SAC, located approximately 14.9 km north-west of the Natural Gas Connection Corridor.
 - Two NNRs:
 - Teesmouth NNR, located approximately 2.7 km west of the Natural Gas Connection Corridor; and

- Durham Coast NNR, located approximately 13.8 km north-west of the Natural Gas Connection Corridor.

2.3.105 There are no proposed Ramsar Sites or potential SPAs within 15 km of the Natural Gas Connection Corridor.

2.3.106 There is one SSSI within 5 km of the Natural Gas Connection Corridor, that being Teesmouth and Cleveland Coast SSSI, located approximately 0.5 km north-east of the Natural Gas Connection Corridor.

2.3.107 There is one LNR within 5 km of the Natural Gas Connection Corridor, that being Seaton Dunes and Common LNR, located approximately 4.1 km north-west of the Natural Gas Connection Corridor.

Hydrology/ Flood Risk

2.3.108 The Tees Estuary at Tees Mouth is located approximately 1.8 km west of the Natural Gas Connection Corridor. Other watercourses within 1 km of the Natural Gas Connection Corridor include:

- The Fleet, located approximately 80 m east of the Natural Gas Connection Corridor;
- The Mill Race, located approximately 0.4 km south of the Natural Gas Connection Corridor.
- Ash Gill, located approximately 0.5 km east of the Natural Gas Connection Corridor;
- Dabholm Gut, located approximately 0.8 km south of the Natural Gas Connection Corridor; and
- Dabholm Beck, located approximately 0.9 km south of the Natural Gas Connection Corridor.

2.3.109 The Environment Agency 'Flood map for planning' indicates that the whole of the Natural Gas Connection Corridor is located within Flood Zone 1, that is defined as "*land having a less than 0.1% AEP of river or sea flooding*".

Geology and Hydrogeology

2.3.110 The Natural Gas Connection Corridor is underlain by a sequence of Made Ground, Tidal Flat Deposits and mudstones of the Redcar Mudstone Formation. An area of Blown Sand superficial deposits may be present along the eastern boundary of the Natural Gas Connection Corridor.

2.3.111 There are no SPZs, NVZs, Drinking Water Protected Areas or Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Natural Gas Connection Corridor.

Cultural Heritage

2.3.112 There are no designated heritage assets within the Natural Gas Connection Corridor.

2.3.113 There are 83 listed buildings within 5 km of the Natural Gas Connection Corridor. The closest are three Grade II listed buildings (Marsh Farmhouse and Farm Cottage,

'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of Marsh Farmhouse'), located approximately 750 m north-east of the Natural Gas Connection Corridor in Warrenby.

2.3.114 There are four Conservation Area within 5 km of the Natural Gas Connection Corridor:

- Coatham, Redcar Conservation Area, located approximately 1.9 km east of the Natural Gas Connection Corridor;
- Kirkleatham Conservation Area, located approximately 3.1 km south-east of the Natural Gas Connection Corridor;
- Wilton Conservation Area, located approximately 4.4 km south-east of the Natural Gas Connection Corridor; and
- Yearby Conservation Area, located approximately 4.4 km south-east of the Natural Gas Connection Corridor.

2.3.115 There is one scheduled monument within 5 km of the Natural Gas Connection Corridor: 'World War I early warning acoustic mirror 650 m north-west of Bridge Farm', located approximately 4.6 km east of the Natural Gas Connection Corridor in Redcar.

2.3.116 There are no world heritage sites, registered parks and gardens, registered battlefields or heritage coasts within 5 km of the Natural Gas Connection Corridor.

Landscape

2.3.117 The Natural Gas Connection Corridor is located within the Tees Lowlands NCA.

2.3.118 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including the Natural Gas Connection Corridor and the surrounding area.

Other Gases Connection Corridor – Main Site A

2.3.119 The identified indicative Other Gases Connection Corridor comprises approximately 33 ha of industrial land connecting the Production Facility to wider gas supply infrastructure in the area. However, the land required for the Other Gases Connection Corridor will be refined during design work prior to submission of the Application. Refer to Section 3.8 for further detail.

2.3.120 The following environmental receptors have been identified in the vicinity of the Other Gases Connection Corridor.

Residential

2.3.121 The Other Gases Connection Corridor is generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 0.9 km north-east of the Other Gases Connection Corridor in Warrenby.

2.3.122 Dormanstown is located approximately 1.1 km to the east of the Other Gases Connection Corridor, and Redcar is located approximately 2.5 km to the east of the Other Gases Connection Corridor.

Traffic and Transport

- 2.3.123 The Tees Valley Line railway runs through approximately 1.1 km of the Other Gases Connection Corridor. Tees Dock Road also passes through the Other Gases Connection Corridor.
- 2.3.124 Bridleway 116/9/1 and footpath 102/2/3 (which form part of the Teesdale Way long distance route and England Coast Path National Trail) run adjacent to the Other Gases Connection Corridor for approximately 0.8 km. A small section of bridleway 116/9/1 falls within the Other Gases Connection Corridor, close to Dabholm Gut. A small section of footpath 102/2A/2 also falls within the Other Gases Connection Corridor, by Tees Dock Road. There are no other National Trails within 5 km of the Other Gases Connection Corridor.
- 2.3.125 Whilst the Other Gases Connection Corridor is located within access land in the England Coastal Margin defined by the CRoW Act (2000), public access for industrial areas in South Tees is currently restricted under the CRoW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

- 2.3.126 Within 15 km of the Other Gases Connection Corridor there are:
- Three SPAs:
 - Teesmouth and Cleveland Coast SPA, located approximately 0.3 km south-west of the Other Gases Connection Corridor;
 - North York Moors SPA, located approximately 10.4 km south-east of the Other Gases Connection Corridor; and
 - Northumbria Coast SPA, located approximately 14.6 km north-west of the Other Gases Connection Corridor.
 - Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site, located approximately 0.3 km south-west of the Other Gases Connection Corridor; and
 - Northumbria Coast Ramsar Site, located approximately 14.6 km north-west of the Other Gases Connection Corridor.
 - Two SACs:
 - North York Moors SAC, located approximately 10.4 km south-east of the Other Gases Connection Corridor; and
 - Durham Coast SAC, located approximately 14.6 km north-west of the Other Gases Connection Corridor.
 - Two NNRs:

- Teesmouth NNR, located approximately 2.2 km west of the Other Gases Connection Corridor; and
- Durham Coast NNR, located approximately 13.5 km north-west of the Other Gases Connection Corridor.

2.3.127 There are no proposed Ramsar Sites or potential SPAs within 15 km of the Other Gases Connection Corridor.

2.3.128 There is one SSSI within 5 km of the Other Gases Connection Corridor, that being Teesmouth and Cleveland Coast SSSI, located approximately 0.3 km south-west of the Other Gases Connection Corridor.

2.3.129 There are two LNRs within 5 km of the Other Gases Connection Corridor: Seaton Dunes and Common LNR, located approximately 3.7 km north-west of the Other Gases Connection Corridor, and Eston Moor LNR, located approximately 4.7 km south-east of the Other Gases Connection Corridor.

Hydrology/ Flood Risk

2.3.130 The Tees Estuary at Tees Mouth is located approximately 1.6 km north-west of the Other Gases Connection Corridor. Other watercourses within 1 km of the Other Gases Connection Corridor include:

- The Fleet, Dabholm Gut, Dabholm Beck and the Mill Race, which are partially or wholly located within the Other Gases Connection Corridor; and
- Ash Gill located approximately 0.4 km east of the Other Gases Connection Corridor.

2.3.131 The Environment Agency 'Flood map for planning' indicates that the majority of the Other Gases Connection Corridor is located within Flood Zone 1, that is defined as "*land having a less than 0.1% AEP of river or sea flooding*". A small part of the Other Gases Connection Corridor, Dabholm Gut, falls within Flood Zones 2 (between 0.1% and 1% AEP river flooding and between 0.1% and 0.5% AEP sea flooding) and 3 (greater than 1% AEP river flooding and greater than 0.5% AEP sea flooding), as illustrated on Figure 11: Water Constraints within 5 km of the Proposed Development Site Boundary (Appendix A).

Geology and Hydrogeology

2.3.132 The Other Gases Connection Corridor is underlain by a sequence of Made Ground, Tidal Flat Deposits, and mudstones of the Triassic Penarth Formation and Jurassic Redcar Mudstone Formation. An area of Blown Sand superficial deposits may be present, underlying a small portion of the north-eastern bend of the Other Gases Connection Corridor.

2.3.133 There are no SPZs, NVZs, Drinking Water Protected Areas or Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Other Gases Connection Corridor.

Cultural Heritage

2.3.134 There are no designated heritage assets within the Other Gases Connection Corridor.

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- 2.3.135 There are 105 listed buildings within 5 km of the Other Gases Connection Corridor. The closest are three Grade II listed buildings (Marsh Farmhouse and Farm Cottage, 'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of Marsh Farmhouse'), located approximately 0.9 km north-east of the Other Gases Connection Corridor in Warrenby.
- 2.3.136 There are four Conservation Areas within 5 km of the Other Gases Connection Corridor:
- Coatham, Redcar Conservation Area, located approximately 2 km east of the Other Gases Connection Corridor;
 - Kirkleatham Conservation Area, located approximately 2.9 km south-east of the Other Gases Connection Corridor;
 - Wilton Conservation Area, located approximately 3.5 km south-east of the Other Gases Connection Corridor; and
 - Yearby Conservation Area, located approximately 4 km south-east of the Other Gases Connection Corridor.
- 2.3.137 There are six scheduled monuments within 5 km of the Other Gases Connection Corridor, the closest of which is 'World War I early warning acoustic mirror 650 m north-west of Bridge Farm', located approximately 4.6 km east of the Other Gases Connection Corridor in Redcar.
- 2.3.138 There are no world heritage sites, registered parks and gardens, registered battlefields or heritage coasts within 5 km of the Other Gases Connection Corridor.

Landscape

- 2.3.139 The Other Gases Connection Corridor is located within the Tees Lowlands NCA.
- 2.3.140 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including the Other Gases Connection Corridor and the surrounding area.

Electrical Connection Corridor – Main Site A

- 2.3.141 The Electrical Connection Corridor connects the Production Facility to the electricity transmission network; it extends from Main Site A in the north, to Grangetown in the south. It comprises approximately 287 ha. However, the land required for the Electrical Connection Corridor will be refined during design work prior to submission of the Application. Refer to Section 3.6 for further detail.
- 2.3.142 The following environmental receptors have been identified in the vicinity of the Electrical Connection Corridor.

Residential

- 2.3.143 The Electrical Connection Corridor is generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 0.6 km north-east of the Electrical Connection Corridor in Warrenby.

2.3.144 Near to Main Site A, the Electrical Connection Corridor is close to Dormanstown and Redcar. Dormanstown is located approximately 0.7 km to the east of the Electrical Connection Corridor, and Redcar is located approximately 2 km to the north-east of the Electrical Connection Corridor. At its southern end, the Electrical Connection Corridor is adjacent to Grangetown.

Traffic and Transport

2.3.145 The Tees Valley Line railway runs through the Electrical Connection Corridor, as does the A1085 Trunk Road, Greystone Road and Tees Dock Road.

2.3.146 There are nine PRoWs within the Electrical Connection Corridor (two of which are bridleways, and seven of which are footpaths). Some of these PRoWs form part of the England Coast Path National Trail and the Teesdale Way long distance route. There are no other National Trails within 5 km of the Electrical Connection Corridor.

2.3.147 Whilst some of the Electrical Connection Corridor is located within access land in the England Coastal Margin defined by the CRoW Act (2000), public access for industrial areas in South Tees is currently restricted under the CRoW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

2.3.148 Within 15 km of the Electrical Connection Corridor there are:

- Three SPAs:
 - Teesmouth and Cleveland Coast SPA, located approximately 0.1 km west of the Electrical Connection Corridor;
 - North York Moors SPA, located approximately 8.3 km south-east of the Electrical Connection Corridor; and
 - Northumbria Coast SPA, located approximately 14.4 km north-west of the Electrical Connection Corridor.
- Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site, located approximately 120 m west of the Electrical Connection Corridor; and
 - Northumbria Coast Ramsar Site, located approximately 14.4 km north-west of the Electrical Connection Corridor.
- Two SACs:
 - North York Moors SAC, located approximately 8.4 km south-east of the Electrical Connection Corridor; and
 - Durham Coast SAC, located approximately 14.4 km north-west of the Electrical Connection Corridor.

- Two NNRs:
 - Teesmouth NNR, located approximately 2.1 km west of the Electrical Connection Corridor; and
 - Durham Coast NNR, located approximately 13.4 km north-west of the Electrical Connection Corridor.

2.3.149 There are no proposed Ramsar Sites or potential SPAs within 15 km of the Electrical Connection Corridor.

2.3.150 There are two SSSIs within 5 km of the Electrical Connection Corridor:

- Teesmouth and Cleveland Coast SSSI, located approximately 120 m west of the Electrical Connection Corridor; and
- Lovell Hill Pools SSSI, located approximately 4 km south-east of the Electrical Connection Corridor.

2.3.151 There are four LNRs within 5 km of the Electrical Connection Corridor:

- Eston Moor LNR, located approximately 2.6 km south-east of the Electrical Connection Corridor;
- Flatts Lane Woodland Country Park LNR, located approximately 3.8 km south of the Electrical Connection Corridor
- Seaton Dunes and Common LNR, located approximately 3.7 km north-west of the Electrical Connection Corridor; and
- Berwick Hills LNR, located approximately 4.2 km south-west of the Electrical Connection Corridor.

Hydrology/ Flood Risk

2.3.152 The Tees Estuary at Tees Mouth is located approximately 1.2 km west of the Electrical Connection Corridor. Other watercourses within 1 km of the Electrical Corridor include:

- The Mill Race, Knitting Wife Beck, The Fleet, Cross Beck, Dabholm Gut and Dabholm Beck, which are partially or wholly located within the Electrical Connection Corridor;
- Ash Gill, adjacent to the Electrical Connection Corridor;
- Kinkerdale Beck, located approximately 80 m east of the Electrical Connection Corridor;
- Kettle Beck, located approximately 80 m south of the Electrical Connection Corridor;
- Castle Gill, located approximately 0.3 km south-east of the Electrical Connection Corridor; and
- Mains Dike, located approximately 0.8 km south-east of the Electrical Connection Corridor.

2.3.153 The Environment Agency 'Flood map for planning' indicates that the majority of the Electrical Connection Corridor is located within Flood Zone 1 that is defined as, "*land having a less than 0.1% AEP of river or sea flooding*". As illustrated on Figure 11: Water Constraints within 5 km of the Proposed Development Site Boundary (Appendix A), a small part of the Electrical Connection Corridor, between the Teesport Estate and the Trunk Road Industrial Estate, falls within Flood Zones 2 (between 0.1% and 1% AEP river flooding and between 0.1% and 0.5% AEP sea flooding) and 3 (greater than 1% AEP river flooding and greater than 0.5% AEP sea flooding).

Geology and Hydrogeology

2.3.154 The Electrical Connection Corridor is underlain by a sequence of Made Ground, Tidal Flat Deposits, Blown Sand, Devensian Glaciolacustrine Deposits (Clay and Silt) and Devensian Glacial Till. The superficial deposits are underlain by mudstones from the Mercia Mudstone Group, Penarth Formation and the Redcar Mudstone Formation.

2.3.155 There are no SPZs, NVZs, Drinking Water Protected Areas or Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Electrical Connection Corridor.

Cultural Heritage

2.3.156 There are no designated heritage assets within the Electrical Connection Corridor.

2.3.157 There are 144 listed buildings within 5 km of the Electrical Connection Corridor. The closest are three Grade II listed buildings (Marsh Farmhouse and Farm Cottage, 'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of Marsh Farmhouse'), located approximately 610 m north-east of the Electrical Connection Corridor in Warrenby.

2.3.158 There are five Conservation Areas within 5 km of the Electrical Connection Corridor:

- Coatham Conservation Area, Redcar, located approximately 1.6 km north-east of the Electrical Connection Corridor;
- Wilton Conservation Area, located approximately 1.8 km south-east of the Electrical Connection Corridor;
- Kirkleatham Conservation Area, located approximately 2.2 km east of the Electrical Connection Corridor;
- Yearby Conservation Area, located approximately 3.2 km south-east of the Electrical Connection Corridor; and
- Ormesby Hall Conservation Area, located approximately 3.9 km south of the Electrical Connection Corridor.

2.3.159 There are 19 scheduled monuments within 5 km of the Electrical Connection Corridor, the closest of which is 'Eston Nab hill fort, palisaded settlement and beacon', located approximately 2.6 km south of the Electrical Connection Corridor.

2.3.160 There are no registered parks and gardens, world heritage sites, registered battlefields or heritage coasts within 5 km of the Electrical Connection Corridor.

Landscape

- 2.3.161 The Electrical Connection Corridor is located within the Tees Lowlands NCA.
- 2.3.162 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including the Electrical Connection Corridor and the surrounding area.

Water Connections Corridor – Main Site A

- 2.3.163 The Water Connections Corridor are described in Section 3.7 and comprises approximately 218 ha of mostly industrial land. The land required for the Water Connections Corridor will be refined during design work prior to submission of the Application.
- 2.3.164 The following environmental receptors have been identified in the vicinity of the Water Connections Corridor.

Residential

- 2.3.165 The Water Connections Corridor is generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 0.4 km east of the Water Connections Corridor in Warrenby.
- 2.3.166 Dormanstown is located approximately 0.4 km to the east of the Water Connections Corridor, and Redcar is located approximately 2 km to the east of the Water Connections Corridor.

Traffic and Transport

- 2.3.167 The Tees Valley Line railway and the A1085 Trunk Road pass through the Water Connections Corridor.
- 2.3.168 There are three PRowS within the Water Connections Corridor: bridleways 116/9/1, 116/9/2 and 116/10/2. Bridleways 116/9/1 and 116/9/2 form part of the England Coast Path National Trail and Teesdale Way long distance route. There are no other National Trails within 5 km of the Water Connections Corridor.
- 2.3.169 Whilst the Water Connections Corridor is located within access land in the England Coastal Margin defined by the CRow Act (2000), public access for industrial areas in South Tees is currently restricted under the CRow act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

Ecology

- 2.3.170 Within 15 km of the Water Connections Corridor there are:
- Three SPAs:
 - Teesmouth and Cleveland Coast SPA, located approximately 0.5 km west of the Water Connections Corridor;
 - North York Moors SPA, located approximately 9.1 km south-east of the Water Connections Corridor; and

- Northumbria Coast SPA, located approximately 14.9 km north-west of the Water Connections Corridor.
- Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar Site, located approximately 0.5 km north of the Water Connections Corridor; and
 - Northumbria Coast Ramsar Site, located approximately 14.9 km north-west of the Water Connections Corridor.
- Two SACs:
 - North York Moors SAC, located approximately 9.1 km south-east of the Water Connections Corridor; and
 - Durham Coast SAC, located approximately 14.9 km north-west of the Water Connections Corridor.
- Two NNRs:
 - Teesmouth NNR, located approximately 2.6 km west of the Water Connections Corridor; and
 - Durham Coast NNR, located approximately 13.8 km north-west of the Water Connections Corridor.

2.3.171 There are no proposed Ramsar Sites or potential SPAs within 15 km of the Water Connections Corridor.

2.3.172 There are two SSSIs within 5 km of the Water Connections Corridor:

- Teesmouth and Cleveland Coast SSSI, located approximately 70 m north of the Water Connections Corridor; and
- Lovell Hill Pools SSSI, located approximately 3.6 km south-east of the Water Connections Corridor.

2.3.173 There are three LNRs within 5 km of the Water Connections Corridor:

- Seaton Dunes and Common LNR, located approximately 4.1 km north-west of the Water Connections Corridor;
- Eston Moor LNR, located approximately 3.6 km south of the Water Connections Corridor; and
- Errington Wood LNR, located approximately 4.1 km south-east of the Water Connections Corridor.

Hydrology/ Flood Risk

2.3.174 The Tees Estuary at Tees Mouth is located approximately 1.4 km west of the Water Connections Corridor. Other watercourses within 1 km of the Water Connections Corridor include:

- The Fleet, The Mill Race and Dabholm Beck, Dabholm Gut and Mains Dike, all of which are partially located within the Water Connections Corridor; and
- Ash Gill, adjacent to the Water Connections Corridor.

2.3.175 The Environment Agency 'Flood map for planning' indicates that the majority of the Water Connections Corridor is located within Flood Zone 1 that is defined as, "*land having a less than 0.1% AEP of river or sea flooding*". As illustrated on Figure 11: Water Constraints within 5 km of the Proposed Development Site Boundary (Appendix A), a small part of the Water Connections Corridor, between the Teesport Estate and Trunk Road Industrial Estate, Dormanstown, falls within Flood Zones 2 (between 0.1% and 1% AEP river flooding and between 0.1% and 0.5% AEP sea flooding) and 3 (greater than 1% AEP river flooding and greater than 0.5% AEP sea flooding).

Geology and Hydrogeology

2.3.176 The Water Connections Corridor is underlain by Made Ground, Tidal Flat Deposits, Glaciolacustrine Deposits, Devensian Glacial Till and mudstones of the Redcar Mudstone Formation. An area of Blown Sand (superficial deposits) may be present along the eastern boundary of the Water Connections Corridor.

2.3.177 There are no SPZs, NVZs, Drinking Water Protected Areas or Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Water Connections Corridor.

Cultural Heritage

2.3.178 There are no designated heritage assets within the Water Connections Corridor.

2.3.179 There are 127 listed buildings within 5 km of the Water Connections Corridor. The closest are three Grade II listed buildings (Marsh Farmhouse and Farm Cottage, 'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of Marsh Farmhouse'), located approximately 0.5 km east of the Water Connections Corridor in Warrenby.

2.3.180 There are five Conservation Areas within 5 km of the Water Connections Corridor:

- Kirkleatham Conservation Area, located approximately 0.9 km east of the Water Connections Corridor;
- Coatham Conservation Area, Redcar, located approximately 1.6 km north-east of the Water Connections Corridor;
- Wilton Conservation Area, located approximately 1.9 km south-east of the Water Connections Corridor;
- Yearby Conservation Area, located approximately 2 km south-east of the Water Connections Corridor; and

- Marske-by-the-Sea Conservation Area, located approximately 4.8 km east of the Water Connections Corridor.

2.3.181 There are 19 scheduled monuments within 5 km of the Water Connections Corridor, the closest of which is 'World War I early warning acoustic mirror 650 m north-west of Bridge Farm', located approximately 3.1 km east of the Water Connections Corridor in Redcar.

2.3.182 There are no world heritage sites, registered parks and gardens, registered battlefields or heritage coasts within 5 km of the Water Connections Corridor.

Landscape

2.3.183 The Water Connections Corridor is located within the Tees Lowlands NCA.

2.3.184 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including the Water Connections Corridor and the surrounding area.

CO₂ Export Corridor – RBT Extension

2.3.185 The CO₂ Export Corridor RBT Extension comprises approximately 10ha of industrial land within and adjacent to Main Site A. If Main Site B were to be progressed, both the CO₂ Export Corridor as described for Main Site A, and the CO₂ Export Corridor RBT Extension, would be required, as shown on Figure 3a: Parts of the Proposed Development Site Boundary (Main Site B – RBT).

2.3.186 The following environmental receptors have been identified in the vicinity of CO₂ Export Corridor RBT Extension. Only receptors which are closer to the CO₂ Export Corridor RBT Extension than they are the CO₂ Export Corridors for Main Site A are listed.

- Teesmouth and Cleveland Coast SPA, Teesmouth and Cleveland Coast Ramsar Site and Teesmouth and Cleveland Coast SSSI are located approximately 0.3 km south-west of the CO₂ Export Corridor RBT Extension (for reference, they are located approximately 0.5 km north of the CO₂ Export Corridors);
- Northumbria Coast SPA, Northumbria Coast Ramsar Site and Durham Coast SAC are located approximately 14.2 km north-west of the CO₂ Export Corridor RBT Extension (for reference, they are located approximately 14.6 km north-west of the CO₂ Export Corridors);
- Teesmouth NNR is located approximately 1.9 km west of the CO₂ Export Corridor RBT Extension (for reference, it is located approximately 2.7 km west of the CO₂ Export Corridors);
- Durham Coast NNR is located approximately 13.1 km north-west of the CO₂ Export Corridor RBT Extension (for reference, it is located approximately 13.6 km west of the CO₂ Export Corridors);
- Seaton Dunes and Common LNR is located approximately 3.3 km north-west of the CO₂ Export Corridor RBT Extension (for reference, it is located approximately 3.8 km north-west of the CO₂ Export Corridors);

- The Tees Estuary at Tees Mouth is located approximately 1 km west of the CO₂ Export Corridor RBT Extension (for reference, it is located approximately 1.8 km west of the CO₂ Export Corridors); and
- Dabholm Gut is located approximately 0.7 km south of the CO₂ Export Corridor RBT Extension (for reference, it is located approximately 0.8 km south of the CO₂ Export Corridors).

Hydrogen Pipeline Corridor – RBT Extension

2.3.187 The Hydrogen Pipeline Corridor RBT Extension comprises approximately 12ha of industrial land within Main Site A. If Main Site B were to be progressed, both the Hydrogen Pipeline Corridor as described for Main Site A, and the Hydrogen Pipeline Corridor RBT Extension, would be required, as shown on Figure 3a: Parts of the Proposed Development Site Boundary (Main Site B – RBT).

2.3.188 The Hydrogen Pipeline Corridor RBT Extension is not closer to any sensitive receptors than the Hydrogen Pipeline Corridor for Main Site A.

Natural Gas Connection Corridor – RBT Extension

2.3.189 The Natural Gas Connection Corridor RBT Extension comprises approximately 10 ha of industrial land within and adjacent to Main Site A. If Main Site B were to be progressed, both the Natural Gas Connection Corridor as described for Main Site A, and the Natural Gas Connection Corridor RBT Extension, would be required, as shown on Figure 3a: Parts of the Proposed Development Site Boundary (Main Site B – RBT).

2.3.190 The following environmental receptors have been identified in the vicinity of Natural Gas Connection Corridor RBT Extension. Only receptors which are closer to the Natural Gas Connection Corridor RBT Extension than they are the Natural Gas Connection Corridor for Main Site A are listed.

- Teesmouth and Cleveland Coast SPA, Teesmouth and Cleveland Coast Ramsar Site and Teesmouth and Cleveland Coast SSSI are located approximately 0.3 km south-west of the Natural Gas Connection Corridor RBT Extension (for reference, they are located approximately 0.7 km south-west of the Natural Gas Connection Corridor);
- Northumbria Coast SPA, Northumbria Coast Ramsar Site and Durham Coast SAC are located approximately 14.2 km north-west of the Natural Gas Connection Corridor RBT Extension (for reference, they are located approximately 14.9 km south-west of the Natural Gas Connection Corridor);
- Teesmouth NNR is located approximately 1.9 km west of the Natural Gas Connection Corridor RBT Extension (for reference, it is located approximately 2.7 km west of the Natural Gas Connection Corridor);
- Durham Coast NNR is located approximately 13.1 km north-west of the Natural Gas Connection Corridor RBT Extension (for reference, it is located approximately 13.8 km north-west of the Natural Gas Connection Corridor);

- Seaton Dunes and Common LNR is located approximately 3.3 km north-west of the Natural Gas Connection Corridor RBT Extension (for reference, it is located approximately 4.1 km north-west of the Natural Gas Connection Corridor);
- The Tees Estuary at Tees Mouth is located approximately 1 km west of the Natural Gas Connection Corridor RBT Extension (for reference, it is located approximately 1.8 km west of the Natural Gas Connection Corridor); and
- Dabholm Gut is located approximately 0.7 km south of the Natural Gas Connection Corridor RBT Extension (for reference, it is located approximately 0.8 km south of the Natural Gas Connection Corridor).

Other Gases Connection Corridor – RBT Extension

2.3.191 The Other Gases Connection Corridor RBT Extension comprises approximately 6 ha of industrial land within and adjacent to Main Site A. If Main Site B were to be progressed, both the Other Gases Connection Corridor as described for Main Site A, and the Other Gases Connection Corridor RBT Extension, would be required, as shown on Figure 3a: Parts of the Proposed Development Site Boundary (Main Site B – RBT).

2.3.192 The following environmental receptors have been identified in the vicinity of Other Gases Connection Corridor RBT Extension; only receptors which are closer to the Other Gases Connection Corridor RBT Extension than they are the Other Gases Connection Corridor for Main Site A are listed.

- Northumbria Coast SPA, Northumbria Coast Ramsar Site and Durham Coast SAC are located approximately 14.2 km north-west of the Other Gases Connection Corridor RBT Extension (for reference, they are located approximately 14.6 km north-west of the Other Gases Connection Corridor);
- Teesmouth NNR is located approximately 1.9 km west of the Other Gases Connection Corridor RBT Extension (for reference, it is located approximately 2.2 km west of the Other Gases Connection Corridor);
- Durham Coast NNR is located approximately 13.1 km north-west of the Other Gases Connection Corridor RBT Extension (for reference, it is located approximately 13.5 km north-west of the Other Gases Connection Corridor);
- Seaton Dunes and Common LNR is located approximately 3.3 km north-west of the Other Gases Connection Corridor RBT Extension (for reference, it is located approximately 3.7 km north-west of the Other Gases Connection Corridor); and
- The Tees Estuary at Tees Mouth is located approximately 1 km west of the Other Gases Connection Corridor RBT Extension (for reference, it is located approximately 1.6 km west of the Other Gases Connection Corridor).

Electrical Connection Corridor – RBT Extension

2.3.193 The Electrical Connection Corridor RBT Extension comprises approximately 7 ha of industrial land within and adjacent to Main Site A. If Main Site B were to be progressed, both the Electrical Connection Corridor as described for Main Site A, and

the Electrical Connection Corridor RBT Extension, would be required, as shown on Figure 3a: Parts of the Proposed Development Site Boundary (Main Site B – RBT).

2.3.194 The following environmental receptors have been identified in the vicinity of Electrical Connection Corridor RBT Extension. Only receptors which are closer to the Electrical Connection Corridor RBT Extension than they are the Electrical Connection Corridor for Main Site A are listed.

- Northumbria Coast SPA, Northumbria Coast Ramsar Site and Durham Coast SAC are located approximately 14.2 km north-west of the Electrical Connection Corridor RBT Extension (for reference, they are located approximately 14.4 km north-west of the Electrical Connection Corridor);
- Teesmouth NNR is located approximately 1.9 km west of the Electrical Connection Corridor RBT Extension (for reference, it is located approximately 2.1 km west of the Electrical Connection Corridor);
- Durham Coast NNR is located approximately 13.1 km north-west of the Electrical Connection Corridor RBT Extension (for reference, it is located approximately 13.4 km north-west of the Electrical Connection Corridor);
- Seaton Dunes and Common LNR is located approximately 3.3 km north-west of the Electrical Connection Corridor RBT Extension (for reference, it is located approximately 3.7 km north-west of the Electrical Connection Corridor); and
- The Tees Estuary at Tees Mouth is located approximately 0.9 km west of the Electrical Connection Corridor RBT Extension (for reference, it is located approximately 1.2 km west of the Electrical Connection Corridor).

Water Connections Corridor – RBT Extension

2.3.195 The Water Connections Corridor RBT Extension comprises approximately 14 ha of industrial land within and adjacent to Main Site A. If Main Site B were to be progressed, both the Water Connections Corridor as described for Main Site A, and the Water Connections Corridor RBT Extension, would be required, as shown on Figure 3a: Parts of the Proposed Development Site Boundary (Main Site B – RBT).

2.3.196 The following environmental receptors have been identified in the vicinity of Water Connections Corridor RBT Extension; only receptors which are closer to the Water Connections Corridor RBT Extension than they are the Water Connections Corridor for Main Site A are listed.

- Teesmouth and Cleveland Coast SPA and Teesmouth and Cleveland Coast Ramsar Site are located approximately 0.3 km south-west of the Water Connections Corridor RBT Extension (for reference, they are located approximately 0.7 km south-west of the Water Connection Corridor);
- Northumbria Coast SPA, Northumbria Coast Ramsar Site and Durham Coast SAC are located approximately 14.2 km north-west of the Water Connections Corridor RBT Extension (for reference, they are located approximately 14.9 km south-west of the Water Connections Corridor);

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- Teesmouth NNR is located approximately 1.9 km west of the Water Connections Corridor RBT Extension (for reference, it is located approximately 2.6 km west of the Water Connections Corridor);
 - Durham Coast NNR is located approximately 13.1 km north-west of the Water Connections Corridor RBT Extension (for reference, it is located approximately 13.8 km north-west of the Water Connections Corridor);
 - Seaton Dunes and Common LNR is located approximately 3.3 km north-west of the Water Connections Corridor RBT Extension (for reference, it is located approximately 4.1 km north-west of the Water Connections Corridor); and
 - The Tees Estuary at Tees Mouth is located approximately 0.9 km west of the Water Connections Corridor RBT Extension (for reference, it is located approximately 1.4 km west of the Water Connections Corridor).

3.0 PROPOSED DEVELOPMENT

3.1 Overview

3.1.1 As outlined in Section 1.0, the Proposed Development comprises the construction, operation, and maintenance of a 1.2 GWth LHV (Phase 1 600 MWth LHV and Phase 2 600 MWth LHV) Carbon, Capture and Storage (CCS) enabled Hydrogen Production Facility located in the Teesside industrial cluster area. In summary, the Proposed Development also comprises the following elements:

- hydrogen distribution pipelines to supply H₂ to various offtakers on Teesside and within the surrounding area, such pipelines to be utilised in association with the H₂ production plant;
- an Air Separation Unit (ASU) to supply O₂ for the H₂ production process;
- O₂ and N₂ supply pipelines (as an alternative to the ASU) to supply O₂ and N₂ for the H₂ production process;
- CO₂ capture and compression facilities and a connection to the NEP;
- 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;
- water supply and treatment infrastructure;
- wastewater treatment and disposal infrastructure; and
- other utilities connections, telecommunications, and other associated and ancillary infrastructure.

3.1.2 The Production Facility and associated infrastructure which form part of the Proposed Development will be located on the 'Main Site'. There are currently two Main Site options – Main Sites A and B. Main Site A would be located within land owned by Teesworks known as 'The Foundry'. Main Site B would be located to the west of Main Site A within land owned by Redcar Bulk Terminal, known as 'RBT'. Both Main Sites are located within Redcar and Cleveland Borough, with the connection corridors extending further into Stockton-on-Tees and Hartlepool, all within Teesside.

3.1.3 The Production Facility at the Main Site will need a hydrogen pipeline to transport the H₂ produced to potential industrial offtakers around Teesside as well as a CO₂ export connection and other utility connections including natural gas, water, electricity and other gases (O₂ and N₂).

3.1.4 H2Teesside demand will come from multiple end users, including fuel switching within process heat, steam raising and power generation applications.

3.1.5 The proposed capture technology is pre-combustion amine-based absorption-regeneration with an anticipated design carbon capture rate in excess of 95%. The capture rate is anticipated to be secured through the Environmental Permit. H2Teesside will connect via a short CO₂ export connection to NEP infrastructure on

the NZT site to the east of the Main Site A. Based on current projections, H2Teesside will have the capacity to continuously export 1.42 Mt of dehydrated and compressed CO₂ per year per Phase, or 2.84 Mt/year once both phases are operational (100% utilisation) with no temporary CO₂ storage required on Site.

- 3.1.6 At this stage in the design of the Proposed Development, there are still options being considered for various components. The design of the Proposed Development incorporates a necessary degree of flexibility to allow for the future selection of the preferred layout at the Main Site, as well as routing of the hydrogen pipeline and other connections. This will evolve as the design and commercial agreements progress throughout the preparation of the Application.
- 3.1.7 The Rochdale Envelope approach has been adopted to ensure that a worst case in terms of design parameters, proposed development extents and options has been considered at the EIA Scoping stage. It is expected that the current optionality would be reduced, and preferred options confirmed prior to submission of the Application, and the Rochdale Envelope used and assessed will be narrowed accordingly.
- 3.1.8 In addition, some of the design aspects and features of the Proposed Development cannot be confirmed until the Engineering, Procurement and Construction (EPC) Contractor has been appointed. For example, the building sizes and exact location may vary depending on the contractor selected and their specific configuration and selection of plant. Therefore, focused use of the Rochdale Envelope approach will continue to be adopted to define appropriate parameters for use in the EIA.
- 3.1.9 The following sections describe the Proposed Development in more detail as required for the purposes of this EIA Scoping Report and provide where possible a brief description of any optionality still being considered by the Applicant for each element.
- 3.2 Components of the Proposed Development
Hydrogen Production Facility – The Main Site
- 3.2.1 The description of the components of the Proposed Development at the Main Site below applies regardless of whether Main Site A or Main Site B is selected. However, the configuration of the various components within the Main Sites is subject to ongoing studies and dependant on the final technology and site selected.
- 3.2.2 The Hydrogen Production Facility will be designed taking account of Best Available Techniques as set out in the UK Government's guidance on emerging techniques for hydrogen production with carbon capture (Environment Agency, 2023).
- 3.2.3 H2Teesside will utilise natural gas, which will first be pre-reformed with steam over a catalyst bed to break down higher hydrocarbons to primarily carbon oxides and hydrogen. This syngas will then be reformed further using pure O₂ and more steam over catalysts in an Auto Thermal Reformer (ATR).
- 3.2.4 After cooling, the syngas will be reacted in water-gas shift reactors to generate H₂ and CO₂. The CO₂ will be removed from the gas via scrubbing with amine, which will be regenerated to yield a CO₂ stream that will be compressed, dehydrated, and then

exported utilising NEP infrastructure on the NZT site to the east of the Main Site. The captured CO₂ will be further compressed by NEP to be in dense phase for transportation and will be exported using existing infrastructure to the NEP Endurance store beneath the North Sea. The infrastructure required for export and storage (the high-pressure compression plant and CO₂ export pipeline) is subject to separate consent, including through the NZT DCO Project (for which DCO examination has now closed and a decision is anticipated in early May 2023).

- 3.2.5 The resulting low-carbon H₂ will be purified to >98 mol% H₂ and compressed and conditioned before exporting via the new proposed purpose-built hydrogen pipeline system to transport the H₂ to offtakers located in the Teesside region.
- 3.2.6 Steam is required at various stages of the process. Steam is raised in the ATR reformed gas boilers. Steam is then sent to the steam turbine generator (STG) where it is consumed for power generation to power the facility. The power generated by the steam turbine generator will not exceed 50 MW for each phase of the Proposed Development. The remaining saturated steam is used to heat several process streams: in the heater, O₂ preheater, process condensate heater and the CO₂ dryer.

Production Capacity

- 3.2.7 Production is expected to build during the initial 12-18 months of operation in line with offtaker demand. The peak H₂ export rate for each 600 MWth Phase is expected to be 22,175 kg/hr and the peak CO₂ export rate is 161,710 kg/hr. For Phase 1 and 2 combined this would equate to approximately 44,350 kg/hr peak H₂ production and export and 323,420 kg/hr CO₂ export.
- 3.2.8 Once commissioned and operational, the Production Facility will be designed to operate at all times, twenty-four hours a day, seven days per week until decommissioning, with brief exceptions for planned outages such as for maintenance and repair.
- 3.2.9 A schematic of the H₂ production process is provided at Plate 3-1 below.

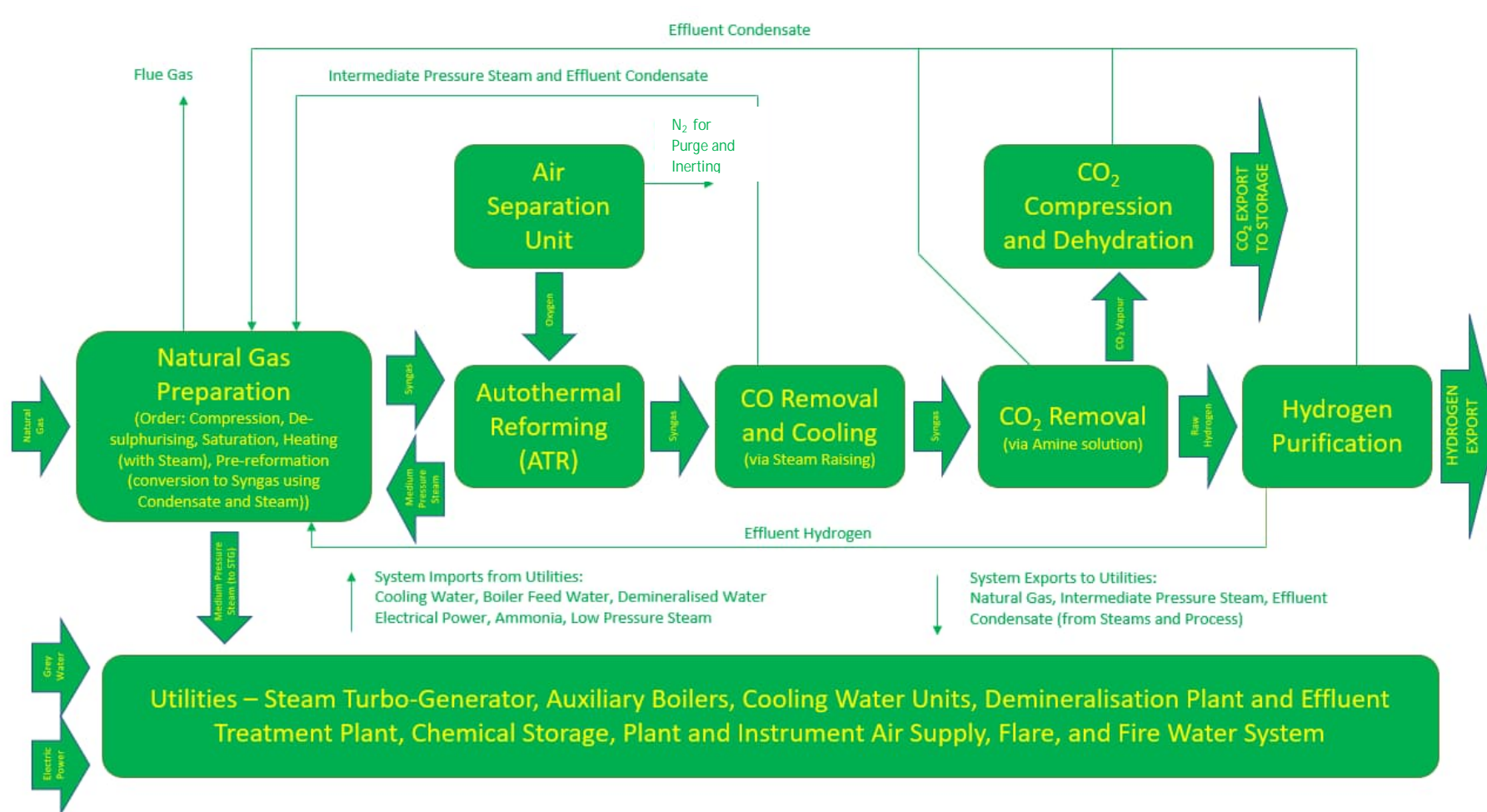


Plate 3-1: H2Teesside Blue Hydrogen Indicative Process Schematic

Note: if O₂ and N₂ are supplied by offsite sources, no ASU will be required.

3.2.10 An outline description of the process infrastructure required for the operation of the Production Facility is presented below. Details on the likely additional infrastructure that would be installed as part of Phase 2 is outlined in Section 3.13.

- A new Above Ground Installation (AGI) on the Main Site to receive natural gas which is compressed and pre-treated for use in the reforming process;
- A Hydrogen Unit (also called an ATR) where the main process of reforming occurs, fitted with Selective Catalytic Reduction (SCR). The Hydrogen Unit also includes the following component units:
 - pre-treatment to remove sulphur species;
 - pre-Reformer to reform longer hydrocarbons to methane, H₂ and CO;
 - shift reactors for conversion of carbon monoxide (CO) to H₂ and CO₂ and heat recovery in the form of steam for reuse in the process;
 - CO₂ absorbers to separate the majority of the CO₂ from the syngas mixture;
 - compressors to increase the pressure of the CO₂ prior to drying (dehydration);
 - compressors where raw H₂ is recycled for input back into the natural gas feed for pre-treatment; and
 - a methanator or Pressure Swing Adsorber (PSA) where raw H₂ is further purified and dehydrated and prepared for export to the pipeline networks, after passing through a compressor to achieve the required pressure of 40 bar and cooled to 30 degrees Celsius for export.

3.2.11 In addition, the following ancillary infrastructure may be required for the Proposed Development:

- Air Separation Units for the compression and separation of air, which is passed through a rectification column to produce O₂ for use in the ATR. Also includes provision of liquid oxygen and liquid nitrogen storage for back up. The Applicant is also looking at options to utilise O₂ from BOC, a nearby supplier which would remove the requirement for an onsite ASU and onsite liquid storage. This is subject to further discussions with BOC and detailed design work.
- Cooling Water Circulation System including towers, pumps and circuit piping to supply cooling water where it is needed throughout the plant. This will require topping up from time to time due to losses from evaporation and blowdown.
- Auxiliary Boilers which will be natural gas fired and used for H₂ plant commissioning (start-up) and are not expected to be required during normal day to day operation of the plant.

- A Steam Turbine Generator (STG) which utilises steam produced in the process to produce electricity to power the plant. The power generated by the STG will not satisfy the total demand of the plant, therefore electrical power will be imported from the grid continuously.
- A Source Water Pre-treatment Plant (if required subject to the agreement with Northumbrian Water (i.e. Bran Sands WwTW) or 3rd party providers) will be used to pre-treat the source water prior to the demineralisation stage and would include Dissolved Air Flotation (DAF) in case of River Water, Ultrafiltration (UF) (for removal of fine solids), and reverse osmosis (RO) for removal of ions.
- A Demineralisation Plant will be used to treat water supplied to the Proposed Development Site (if used), stripped process condensate, flare knockout liquid and steam condensate from power generation and blowdown. The DMW will be pumped to all locations where it is required within the plant.
- An Effluent Treatment Plant (ETP), which if required will consist of an oily water separator, neutralisation sump, and storm water sump. All oily water effluents produced by the plant will be sent to the oil water separator. Post-separation, the liquid effluent will be discharged as final to Bran Sands WwTW and the solids will be sent for disposal offsite.
- A Flare. Any fluid released from any high operating pressure parts of the plant during an emergency will be collected in the flare header system and sent to the flare drum where any liquid associated with the gas is separated. Fluids released from low pressure parts of the plant will be sent directly to a dedicated low pressure flare tip in the flare system. The gas from the flare drum is sent to the flare system where it is safely disposed of by combustion. The liquid collected in the drum is pumped by the flare pump to the DMW plant package.
- A Fire Water System consisting of a fire water tank (supplied by grey or raw water), pumps and firefighting system.
- Chemical Storage for additives and fuel such as aqueous ammonia (NH₃), amines and diesel, which are imported by tanker.

3.2.12 Water management options are summarised in Plate 3-2, below.

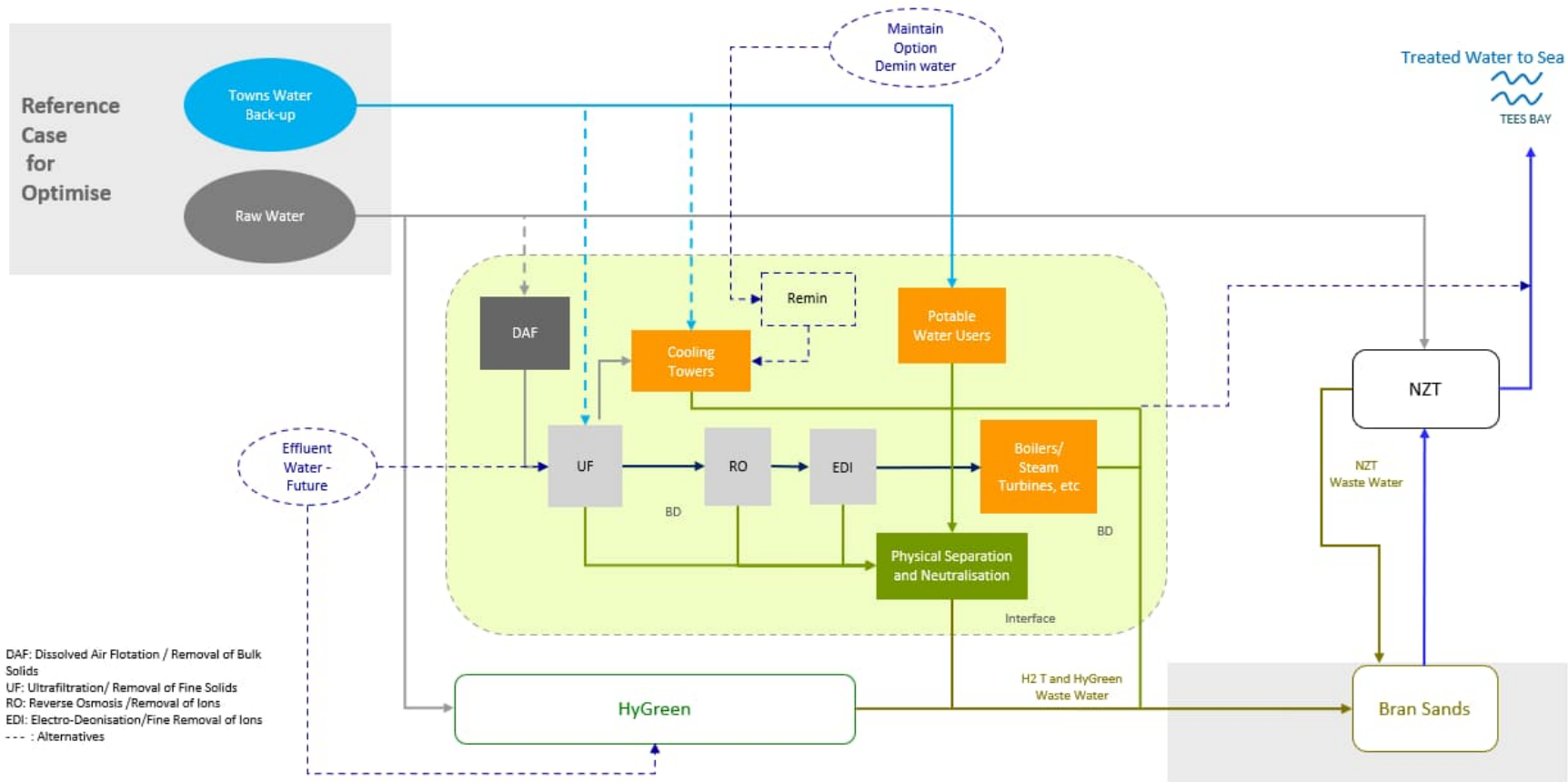


Plate 3-2: Water Management Options (Indicative)

3.2.13 In addition to the above the following components and facilities will be incorporated into the layout as required:

- Main Site entrance (main access with gated entry) as well as a 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;
- carparking; and
- lorry holding and security inspection areas.

3.2.14 The Production Facility will be fenced securely with some internal processes having further internal fencing installed around them as required.

3.3 CO₂ Export Connection

3.3.1 CO₂ captured and compressed at H2Teesside will be exported at an MOP of up to 28 barg and in a pipeline of up to 22" diameter to feed into the NEP CO₂ gathering system via a short CO₂ export connection pipeline between the H2Teesside Production Facility and the NEP development to the east, for high-pressure compression. CO₂ in dense-phase will then be exported off shore for geological storage offsite, at the Endurance Store in the Southern North Sea, via NEP transport infrastructure. Geological storage and CO₂ transportation from H2Teesside will be managed and operated by NEP.

3.3.2 At this early stage in the design and assessment process and in applying the Rochdale Envelope approach, the land required for the CO₂ Export options for Main Sites A and B have been depicted as broad corridors (see Figures 4 and 4a, Appendix A) and it is expected that the extents of these will be refined further as the preparation of the Application progresses. At this stage in the design development, the CO₂ export connection may be entirely above or below ground or a combination of the two.

3.4 Natural Gas Supply Connection

3.4.1 Natural gas will need to be imported to the Production Facility for use in the reforming process. The exact routing of this connection is to be confirmed and subject to ongoing design, however at this stage it is anticipated that a 24" pipeline will be constructed which will connect the proposed Production Facility at the Main Site (A or B) to the wider gas supply network at a tie in point to infrastructure constructed by NZT Power as part of the NZT development.

3.4.2 At this stage in the design development, the natural gas connection may be entirely above or below ground or a combination of the two. At this stage it is assumed that below ground construction of the Natural Gas Connection will use a combination of

open-trench and trenchless technologies dependent upon engineering and environmental constraints.

3.4.3 At this early stage in the design and assessment process and in applying the Rochdale Envelope approach, the potential areas required for the gas connection options have been depicted as a broad corridor (see Figure 6: Natural Gas Connection Corridor (Main Site A – Foundry) and Figure 6a: Natural Gas Connection Corridor (extension required for Main Site B – RBT), included at Appendix A). It is expected that the extent of this will be refined further, and the routing options may be reduced as the DCO progresses.

3.5 Hydrogen Pipeline Corridor

3.5.1 A gaseous phase hydrogen pipeline network is required to connect various potential industrial offtakers across the Tees Valley to the Production Facility at either Main Site A or B.

3.5.2 Once processed to the required specification and compressed at either of the Main Sites, H₂ will be exported using the proposed hydrogen pipeline, at up to 24" diameter and with a Maximum Operating Pressure (MOP) of up to 49 barg (plus extension for Main Site B). The Hydrogen Pipeline Corridor for both sites will require a crossing of the River Tees via an HDD or MBT to export to customers to the northern side of the river. The hydrogen pipelines will run up to tie-in points with the relevant offtaker (likely to be, but not necessarily having to be) at the offtakers' site boundaries. At this stage, any works beyond tie-in points are assumed to be progressed separately by the relevant offtaker.

3.5.3 At this stage in the design development, the Hydrogen may be either above or below ground.

3.5.4 At this stage several options are being considered for crossing under the River Tees, including the construction of new trenchless crossings (in pipelines or tunnels) or the repurposing of existing pipelines or tunnels (where feasible). Although subject to ongoing studies (engineering and environmental), the construction methodology most likely to be used for the crossing of the River Tees will either be by HDD or using a MBT.

3.5.5 Various route options and construction methodologies are being considered throughout the proposed hydrogen pipeline networks for both Main Site options. These include options such as trenchless crossings (likely HDD), below ground open trench (buried), installation on existing above ground pipe racks, and repurposing and reuse of existing pipelines (where possible). However, this is subject to ongoing design work, discussions with landowners and statutory consultees as well as being informed by environmental surveys.

3.5.6 Ultimately a single route will be selected. Refinement on this optionality continues to be informed by ongoing studies and assessment work. Where possible, the route chosen will seek to avoid environmentally sensitive areas and utilise existing established pipeline routes, and/ or the least intrusive construction methodologies (e.g. trenchless methods, as opposed to open-cut trench).

3.5.7 At the north-western extent of the hydrogen pipeline network various options are still being considered and assessed, having regard to engineering constraints and environmental sensitivities particularly around the Greatham Creek area. Table 3-1 provides a summary of the route options and construction methodologies being considered by the Applicant based on the studies carried out to date. However, the feasibility of a final route and construction methodology chosen will remain the subject of further studies which will continue as the EIA progresses. Final routing and methodologies will take into consideration the location of sensitive environmental receptors including but not limited to statutory designated sites (such as Ramsar sites, SPAs and SSSIs) within the area.

Table 3-1: Routing Optionality and Construction Methodologies

CONSTRUCTION METHODOLOGY	REQUIREMENT IN RELATION TO CURRENT ROUTING OPTIONS	COMMENTARY
Open Cut trench-buried	Currently being considered as a construction methodology for all route options (in-part).	For all of the route options there is open cut trenching (resulting in buried pipelines) proposed. The Applicant is considering alternative construction methodologies where possible to reduce the amount of open cut required, particularly in sensitive areas.
Trenchless (HDD/MBT)	Trenchless crossings (either HDD/MBT) are proposed for all of the River Tees crossing options. Currently being considered for some of the options, generally where the pipeline crosses particularly sensitive areas.	The Applicant is not considering any scenario other than trenchless for the crossing of the River Tees. The hydrogen pipeline around the Greatham Creek area interfaces with various environmentally sensitive receptors and constraints. The routing options include a section of HDD or use of existing pipe bridges to cross Greatham Creek, reducing the direct impacts that would be experienced as a result of open-cut trenching across the creek. HDD is the preferred option for crossing Greatham Creek. Whilst trenchless methods are proposed to avoid sensitive areas, open cut trenching is likely to be used within less sensitive areas.
Repurposing of existing pipelines	Currently being considered for part of one of the options (south of Seal Sands).	At the northern extent of the Proposed Development Site (south of Seal Sands) there is an option to repurpose and reuse an existing disused pipeline which crosses the

CONSTRUCTION METHODOLOGY	REQUIREMENT IN RELATION TO CURRENT ROUTING OPTIONS	COMMENTARY
		Tees and avoids the need for a separate constructed crossing.
Utilising existing pipeline corridors and other pipeline infrastructure.	<p>Currently being considered for various parts of the hydrogen pipeline corridor. This includes the parts of the route to the south of the Proposed Development Site, which follows the route of the existing main link line.</p> <p>One option for a crossing of Greatham Creek is utilising an existing pipe bridge to the west of Seal Sands Bay, though HDD is the preferred option for this location, as indicated above.</p>	<p>For the majority of the hydrogen pipeline corridor south of the River Tees, it is proposed to route along existing established pipeline corridors (generally above ground) where possible.</p> <p>Once the hydrogen pipeline crosses the River Tees (via trenchless methods) and emerges on the northern bank of the river, the preferred and most likely option will be to follow the existing link line corridor.</p> <p>In order to route to offtakers further north and as outlined in paragraph 3.5.6, various options are being considered for routing in proximity to and across Greatham Creek.</p> <p>One option for crossing Greatham Creek is to utilise an existing pipe bridge to the west of Seal Sands Bay. Either side of this, open cut trenching may be used to continue the pipeline route. As outlined above, HDD is the preferred option for the crossing of Greatham Creek; the engineering feasibility of this is being investigated.</p>

Note: the above optionality applies to the main Hydrogen Connection Corridor only; not the Hydrogen Connection Corridor RBT Extension.

- 3.5.8 At this early stage in the design and assessment process and in applying the Rochdale Envelope approach, the extent of the Hydrogen Pipeline Corridors for Main Sites A and B has been depicted as broad corridors (see Figures 5 and 5a, Appendix A). In places where the Hydrogen Pipeline Corridor includes areas of existing operational land or facilities (e.g. in the area around Wilton International) this does not imply that the Applicant is proposing to carry out works or lay pipelines in all of these areas; at this stage, the corridor covers a wider area, and will do so until the specific routes, offtakers, and construction methodologies are defined as the design progresses. The

extent of the Hydrogen Pipeline Corridors and the routing options will be refined as the preparation of the Application progresses.

3.6 Electrical Connection

3.6.1 There is existing electrical infrastructure in the area which comprises a combination of overhead and lower voltage underground cables that serve the local area and other industrial users located in proximity to the Proposed Development Site.

3.6.2 Although the Production Facility is capable of supplying a proportion of its energy requirements onsite via the STG, an alternative electricity supply will also be required. Various options are being considered which include a connection to existing and proposed 66 kilovolt (kV) substations at Teesworks or the NEP electrical connection. There is also potential to connect at other substations locally such as Lackenby, Grangetown and Kinkerdale. The final decision on substation choice will be subject to design development and further work based on constructability and electrical network resilience and capacity.

3.6.3 The size, timing and location of any connection will be determined in consultation with the relevant stakeholders. In addition to the potential connection options with Teesworks, enquiries have been submitted to NPG for at least 100 MW capacity, and potential synergies with NZT are being explored. These discussions will be ongoing as the preparation of the Application progresses.

3.6.4 At this stage in the design development, the electrical connection may be entirely above or below ground or a combination of the two.

3.6.5 At this early stage in the design and assessment process and in applying the Rochdale Envelope approach, the land required for the electrical connection options for Main Sites A and B have been depicted as broad corridors (see Figures 7 and 7a, Appendix A) and it is expected that the extents of these will be refined further as the preparation of the Application progresses.

3.7 Water Connections

3.7.1 Water supply and discharge connections are required for the process at the Production Facility including for cooling water purposes and discharge of treated effluent.

3.7.2 There are two potential alternative sources of water for the Proposed Development:

- Demineralised water (DMW) from Wilton International which will not require onsite source water pre-treatment; or
- Reclaimed water (treated effluent) from Northumbrian Water Ltd's (NWL) Bran Sands Wastewater treatment plant – which might require further pre-treatment for use in the H2Teesside process either at Bran Sands (via a commercial agreement with NWL) or via a dedicated treatment plant at the Main site.

3.7.3 Effluent from the H₂ production process the process will need to be either:

- treated at the Main site and discharged via the NZT effluent outfall under a commercial arrangement with NZT; or
 - sent to the Bran Sands Wastewater treatment plant by a return pipeline and discharged via NWL's permitted discharge to the Dabholm Gut.
- 3.7.4 The Water Connections Corridor therefore includes a pipeline route(s) between Main Sites A or B and Bran Sands WwTW as well as a potential connection to NZT and a potential route for a DMW connection between the Main Site and Wilton International. At this stage in the design development, the water connections may be entirely above or below ground or a combination of the two.
- 3.7.5 At this early stage in the design and assessment process and in applying the Rochdale Envelope approach, the land required for the water connection options currently proposed for Main Site A and B have been depicted as broad corridors (see Figures 8 and 8a, Appendix A). It is expected that the extents of these will be refined further as the preparation of the Application progresses.
- 3.8 Other Gases Connections
- Other gas connection pipelines may be required for the transportation of compressed O₂ and N₂ for use at the Production Facility. At this early stage in the design and assessment process and in applying the Rochdale Envelope approach, the land required for the other gases connection options currently proposed for Main Site A and B have been depicted as a broad corridor (see Figures 9 and 9a, Appendix A). It is expected that the extents of this these will be refined further as the preparation of the Application progresses. At this stage in the design development, the connections for other gases may be entirely above or below ground or a combination of the two.
- 3.9 Hydrogen Storage
- 3.9.1 On-site storage of H₂ is not included within the Proposed Development. Should there be a requirement for H₂ storage on-site, it is expected that this would be small scale pressurised storage and would need to be permitted separately.
- 3.9.2 Off-site storage of H₂ is not included within the Proposed Development for the DCO. Should there be the requirement for off-site storage, it is expected that these would be owned and operated by a third-party provider who would be responsible for any consenting requirements.
- 3.10 Material Storage
- 3.10.1 Chemicals required for the operation of the Production Facility will need to be stored and used at the Main Site. Some of these materials may be classed as hazardous. Where any substance could pose a risk to the environment through its uncontrolled release (e.g. through the surface water drainage system) appropriate containment facilities will be used including (but not limited to) bunds and concrete surfaces appropriately designed and sized for their intended use.

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- 3.10.2 An inventory of materials to be stored on the Main Site will be finalised through the detailed design. However, where storage of hazardous materials, individually or in-combination exceeds the 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, under the Control of Major Accident Hazards (COMAH) and Hazardous Substance Consent regimes respectively. All chemical storage will be regulated by the Environment Agency through an environmental permit that will be required for the operation of the Proposed Development.
- 3.11 Access
- 3.11.1 Access to the Main Sites during the construction phase for HGV construction traffic is likely to be via the existing access road from the A1085 via the former Redcar Steelworks entrance. This route will also be used during operation for staff and other site traffic. This applies to both Main Site A and Main Site B.
- 3.11.2 Options for transportation of Abnormal Indivisible Loads (ALLs) during construction using the local ports are still being considered. The nearest commercial port to the Proposed Development Site is Teesport which could be used for the import of containerised equipment or modular plant. Use of modular plant would minimise the number of HGV movements required for their transportation. The use of the existing wharf at RBT for transportation of abnormal loads will also be considered for modular plant. Consideration will be given to the appropriate port and any required ALL routes during the design process.
- 3.11.3 The Applicant is also exploring the use of railways for the import of materials to the Main Site and associated connection corridors.
- 3.11.4 Construction access routes for the hydrogen pipeline and connection corridors are yet to be defined. However, it is assumed that laydown areas will be identified at suitable locations along the pipeline routes located north of the River Tees to ensure disturbance is kept to a minimum.
- 3.11.5 It is likely that the Main Site construction laydown areas will be utilised during the construction of the sections of the Hydrogen Pipeline Corridor and other connections in proximity (e.g. Water Connections, Natural Gas Connection and Electricity Connection (south of the River Tees)). Currently it is proposed that laydown areas for the Main Site construction will be located on land within, to the east and west of the Main Sites (see Figures 3 and 3a, Appendix A), thereby minimising the distance to the Main Site. Other laydown areas for pipeline construction required will be located within the connection corridors and will be identified in the application for development consent.
- 3.12 Site Clearance and Remediation
- 3.12.1 The Main Sites will require site clearance and remediation prior to the construction of the Proposed Development, to make it fit for purpose. Main Site A is located within land owned by Teesworks which is brownfield land. This land currently contains
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some above and below ground structures and redundant services associated with the former Redcar Steelworks and earlier development on the site.

- 3.12.2 It is assumed at this stage that the removal of those structures, clearance and remediation of Main Site A to a suitable development platform level will be undertaken by Teesworks prior to the commencement of construction of the Proposed Development and that Teesworks will obtain the necessary consents and permits to do this work.
- 3.12.3 The ES will not include an assessment of the likely significant environmental effects of undertaking required 'enabling works' on Main Site A (including demolition and remedial works) as these will be undertaken by Teesworks. For Main Site B, demolition and remedial works may be undertaken by the Applicant and will require assessment. For both Main Sites A and B the impacts of the construction of the Proposed Development by the Applicant's contractors will need to be assessed.
- 3.12.4 Ground conditions vary across Main Site A depending on the historical uses. Accordingly, a programme of Ground Investigation (GI) works will be undertaken to assess these. The design and extent of these investigations is in progress and will provide the necessary information to inform the requirements of any future Environmental Permit as well as the design and layout of the Proposed Development.
- 3.12.5 This investigation will also inform if changes to site levels are required to facilitate the construction of the Proposed Development. For the purposes of the environmental assessments (including the Landscape and Visual Impact Assessment (LVIA)) a maximum ground level will be assessed as this represents the worst case for landscape and visual impact. The Flood Risk Assessment (FRA) will identify the minimum ground level which minimises the risk of flooding.
- 3.12.6 Similarly to Main Site A, remediation will be required at Main Site B prior to construction; it will either be the subject of a separate planning application under the Town and Country Planning Act 2017 or consented via the DCO. As such it will be assessed in the ES if Main Site B is selected. The scope of remediation requirements is subject to further studies, but it is assumed that some demolition will be required and that a remediation strategy would specify requirements for localised stripping of material, ground infilling and raising supported by testing and material replacement, when necessary. This would include identification and targeted removal of any contaminated material. The land level at Main Site B may need to be raised to achieve an acceptable ground elevation to minimise the risk of flooding as part of site remediation works.
- 3.13 Construction Programme and Management
- 3.13.1 Subject to being granted development consent it is anticipated that construction would commence in mid-2025 at the earliest with enabling works and site clearance (by Teesworks for Main Site A), closely followed by construction of the Phase 1 of the Production Facility including main civils, mechanical and electrical work, hydrogen pipeline and connections construction.

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- 3.13.2 The Construction of Phase 1 is likely to last approximately two years. Phase 2 works would commence thereafter (approximately late 2027/ early 2028) and last a further two to three years, with overall construction expected to be completed by late 2029 or early 2030. The duration of the phase 2 construction might be extended when compared to phase 1 due to potential overlaps in phase 1 commencement of operation and construction activities for phase 2, requiring management of simultaneous operations and minimisation of risks and impacts arising from that.
- 3.13.3 Phase 1 construction works would include the Production Facility at the Main Sites options (Phase 1 components) and the various utility connections required including CO₂ export pipeline to NEP infrastructure, the natural gas, water and electricity connections. Phase 1 would also include the construction of the majority of the hydrogen pipeline except for short additional spurs of the hydrogen pipeline which will be constructed as part of Phase 2.
- 3.13.4 Phase 2 construction at the Main Site would include the infrastructure required for the second Hydrogen Unit train to increase the capacity of the Production Facility by a further 600 MWth. The additional Phase 2 infrastructure would be constructed within the Main Site, adjacent to the Phase 1 previously constructed infrastructure, and is likely to include (subject to detailed design):
- an additional Hydrogen Unit (up to 600 MWth);
 - an additional cooling water circulation system;
 - an additional ASU (if required);
 - expansion of the demineralisation plant as required;
 - additional pipe racking as required within the processing plant as well as to connect to the flare (constructed as part of Phase 1); and
 - short additional spurs of the hydrogen, natural gas and electricity pipeline connections.
- 3.13.5 Suitable safety distances will be included within the site layout to facilitate the construction of Phase 2 whilst retaining full operation of Phase 1.
- 3.13.6 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. An outline construction programme is provided in Table 3-2.
- 3.13.7 The ES will be accompanied by a framework Construction Environmental Management Plan (CEMP), which will describe the specific mitigation measures to be followed to reduce impacts from construction related activities including:
- construction traffic (including parking and access requirements);
 - earthworks;
 - noise and vibration;
 - dust generation; and
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- waste generation.
- 3.13.8 The detailed CEMP will be secured by a requirement of the DCO and will identify the relevant procedures to be adhered to throughout construction. Where possible at this stage potential design and impact avoidance measures relevant to each topic has been included within the each of the technical chapters outlined in Section 6 of this report.
- 3.13.9 Contracts with companies involved in the construction works will incorporate environmental control, health and safety regulations and current guidance, including all necessary permits, 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), Environment Act 1995 and 2021, Hazardous Waste (England and Wales) Regulations 2005, and Environmental Permitting (England and Wales) Regulations 2016.
- 3.13.10 All construction works will adhere to the Construction (Design and Management) (CDM) Regulations 2015.
- 3.14 Staffing
- 3.14.1 Based on an initial estimate, it is considered likely that construction workforce peak numbers will be approximately 3,100 people per day for both Phases 1 and 2. This includes workers associated with both the Main Site and pipeline connections. It is not likely that peak construction phases for Phase 1 and Phase 2 will overlap (see Table 3-1 above).
- 3.14.2 Operation workforce peak numbers will be a maximum of 85 people (staff). Operations staffing will be on a shift basis to be spread over a 24-hour period. Normally staff levels will be 40-50 peak during the week, however, during 28-day maintenance periods which are likely to occur approximately every four years, there would be up to 400 people.

Table 3-2: Indicative Construction Programme to Inform the EIA

	2025				2026				2027				2028				2029				2030			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Construction Phase 1		■	■	■	■	■	■	■	■	■	■	■												
Phase 1 Operation Commences												■												
Construction Phase 2													■	■	■	■	■	■	■	■	■	■		
Phase 2 Operation Commences																						■		

3.15 HGV Movements and Traffic

- 3.15.1 The principal vehicle movements are anticipated to be associated with the construction phase of the Proposed Development.
- 3.15.2 The volume of construction vehicles associated with the delivery of plant and the labour force has not been fully determined at this stage, but as a worst-case scenario at this stage, peak construction staff numbers are likely to be approximately 3,100 for both Phases 1 and 2.
- 3.15.3 This equates to approximately 2,660 two-way vehicle movements per day during the peak construction period, based upon an average car occupancy for workers of 2.33.
- 3.15.4 In terms of construction HGV and LGV movements there are predicted to be around 15,230 deliveries to the Main Site over the full period of construction.
- 3.15.5 In addition, there would also be approximately 4,330 HGV movements associated with the construction of the pipelines over the full period of construction, which equates to around 50 two-way movements per day during the peak month of construction. This includes the entire Hydrogen Pipeline Corridor, both north and south of the Tees.
- 3.15.6 During the operational phase of the Proposed Development, it is anticipated that there will be a maximum workforce of 85 staff, that will be required on a shift basis to be spread over a 24-hour period. Staff will travel to and from work in a variety of directions and the ES will make reasonable assumptions about the regional distribution of journeys to and from the Proposed Development Site.
- 3.15.7 Natural gas will be delivered by pipeline and other operational and maintenance consumables will be managed to be kept as low as is reasonably practicable thereby minimising traffic movements.

3.16 Lighting

- 3.16.1 Some external lighting will be required to ensure the Production Facility can operate safely at all times. An Indicative Lighting Strategy will be prepared and submitted as part of the Application. This will then inform the preparation of an external lighting scheme under a DCO requirement which will be designed in accordance with relevant standards, such as the Guidance Notes for the Reduction of Obtrusive Light (2021) published by the Institute of Lighting Engineers and/or Chartered Institution of Building Services Engineers (CIBSE) requirements, as appropriate. This will ensure that safe working conditions are provided whilst reducing light pollution and the visual impact on the local environment.

3.17 Environmental Management During Operation

- 3.17.1 The Production Facility will require an Environmental Permit and will comply with this under the Environmental Permitting (England and Wales) Regulations 2016 so that any impacts of emissions to air, soil, surface and groundwater, to the environment and human health will be minimised and avoided where possible.

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- 3.17.2 The Proposed Development will be operated in line with appropriate standards and the operator will implement and maintain an Environment Management System (EMS) which will be certified to International Standards Organisation (ISO) 14001. The EMS will outline requirements and procedures required to ensure that the Proposed Development Site is operating to the appropriate standard.
- 3.17.3 Any requirements for sampling and analysis of pollutants will be undertaken where required in accordance with the Environmental Permit.
- 3.18 Decommissioning
- 3.18.1 The Production Facility will have a design life of 25 years once Phase 1 is constructed and total of 28 years once Phase 2 is constructed and operational. However, the operational life could be longer subject to market conditions and plant condition. At the end of its operational life, the most likely scenario would be that the Proposed Development would be shut down, with all above ground structures on the Main Site removed, and the ground remediated as required to facilitate future re-use. The Applicant will assess at that time whether any infrastructure should be retained for future use. The same timescales would apply for the hydrogen pipeline and utility connections.
- 3.18.2 A Decommissioning Plan (including Decommissioning Environmental Management Plan) would be produced and agreed with the Environment Agency as part of the Environmental Permitting surrender process. The Decommissioning Environmental Management Plan would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated.

It is often the case that sufficient information is not available at the time of assessment to inform an assessment of decommissioning impacts, however, this will be assessed where possible within the ES. It is generally assumed that the environmental effects associated with the decommissioning phase would be no worse than those experienced during construction and these will be assessed on this basis.

4.0 CONSIDERATION OF ALTERNATIVES

4.1 Introduction

4.1.1 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 the likely significant environmental impacts of each alternative. 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.

4.2 The Do Nothing Alternative

4.2.1 The 'Do Nothing' alternative would be where the Proposed Development would not be developed, meaning that the opportunity for industrial offtakers 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 10 GW of low carbon H₂ production by 2030.

4.2.2 In addition, carbon capture is recognised as being essential to seeing through commitments government has made to achieving net zero. The Proposed Development through its links to the NZT/ NEP development will contribute to and facilitate the path towards net zero in the UK. The 'Do Nothing' alternative scenario is generally discounted on the basis that there is a clear need for the Proposed Development. This will be outlined in more detail in Preliminary Environmental Information (PEI) Report and subsequent ES.

4.3 Site and Design Alternatives

4.3.1 The Applicant, based on the site selection process and the information and data which is emerging to inform these decisions, is progressing concept designs for two Main Site Options – Main Site A (Foundry) and Main Site B (RBT). The location of the Proposed Development Site in Teesside provides proximity to both existing and potential future users of low carbon hydrogen and access to the off-shore Endurance carbon store via NEP's nearby infrastructure.

4.3.2 Various factors are influencing the site selection process; in particular, process safety considerations. Both Main Site locations are sufficiently remote from any safety sensitive receptors, thereby minimising process safety risks. In addition, both Main Site options can be easily connected to the required infrastructure (including natural gas, water and electrical).

4.3.3 Main Site A is adjacent to the NEP onshore facilities at NZT, thereby simplifying the CO₂ connection corridor routing. Main Site A also presents an opportunity to consider locating other proposed bp projects in Teesside (such as HyGreen, a proposed green hydrogen project) adjacent to the Proposed Development Site, allowing synergies between the projects to be explored.

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- 4.3.4 Main Site B is also in close proximity to NEP onshore facilities at NZT. It is closer to PD Ports than Main Site A, potentially enabling easier transportation by barge, and reducing the requirement for transport by road. There are no significant underground obstructions within Main Site B; as such, there is minimal requirement for extensive excavation works.
- 4.3.5 Alternative development layouts within the Main Site are also being evaluated for both Main Sites A and B. It is proposed that other project alternatives will be considered, and options refined as the Application progresses including (but not limited to):
- the layout of the Proposed Development including the configuration of the structures and buildings within the chosen Main Site;
 - the design of the Proposed Development (e.g. the solution chosen in terms of O₂ and N₂ (whether sourced locally or requiring an ASU));
 - the options and refinement of routes carried forward for connection to the Natural Gas and Electricity Grids within the currently proposed connection corridors;
 - the options and refinement of routing for the hydrogen pipeline within the currently proposed Hydrogen Pipeline Corridor; and
 - the options and refinement of routing for the Water Connection within the currently proposed Water Connections Corridor.
- 4.3.6 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.
- 4.3.7 Where, at the time of 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 principle outlined in PINS Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2018).

5.0 PLANNING POLICY AND NEED

5.1 Introduction

5.1.1 This chapter of the EIA Scoping Report provides an overview of the planning and energy policy of relevance to the Proposed Development, and where that policy identifies the need for the Proposed Development.

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

5.1.3 The following planning and energy policy is of relevance to the Proposed Development:

- National Policy Statements (NPSs) for Energy;
- Marine Policy Statements (MPSs) and Plans;
- Government Energy and Climate Change Policy;
- The National Planning Policy Framework (NPPF); and
- Local Planning Policy.

5.1.4 These are considered in the sections below.

5.2 National Policy Statements for Energy

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

5.2.2 Section 104 of the PA 2008 provides that where a NPS has effect, the SoS must determine the application in accordance with the relevant NPSs and appropriate marine policy documents (if any) having regard to any local impact report produced by the relevant LPA; any matters prescribed in relation to development of the description to which the application relates; and any other matters which the SoS thinks are both "*important and relevant*" to their decision, unless this would:

- lead to the UK being in breach of its international obligations;
- be in breach of any statutory duty that applies to the SoS;
- be unlawful;
- result in the adverse impacts of the development outweighing the benefits; or
- be contrary to any condition prescribing how decisions regarding an NSIP application are to be taken.

5.2.3 Section 105 of the PA 2008 relates to decision on applications where no NPS has effect, that is, where there is no NPS in place relating to the specific type of

development. In such cases, Section 105 states that in deciding the application the SoS must have regard to any relevant local impact report produced by the relevant LPA; any matters prescribed in relation to development of the description to which the application relates; and any other matters which the SoS thinks are both important and relevant to their decision.

- 5.2.4 In light of recent case law, and until revised NPSs are designated which change the position (as they are anticipated to do), the Applicant recognises that those aspects of the Proposed Development which are automatically NSIP would be determined under Section 104 and those aspects which are development for which development consent is required pursuant to the Section 35 Direction would be determined under Section 105.

Current NPSs

- 5.2.5 Several NPSs have been designated in relation to energy infrastructure. The current energy NPSs were published in July 2011 by the SoS for the Department for Energy and Climate Change (now Business, Energy and Industrial Strategy). The designated NPSs include an overarching NPS setting out general policies and assessment principles for energy infrastructure and a number of technology specific NPSs. The NPSs considered to be of relevance to the Proposed Development are:

- the Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a);
- the NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (DECC, 2011b); and
- the NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011c).

- 5.2.6 Part 3 of EN-1 '*The need for new nationally significant energy infrastructure projects*' defines and sets out the '*need*' for nationally significant energy infrastructure. Paragraph 3.1.1 states that the UK needs all types of energy infrastructure covered by the NPS to achieve energy security at the same time as dramatically reducing greenhouse gas (GHG) emissions. Paragraph 3.1.2 goes on to state that it is for industry to propose the type of energy infrastructure and that the Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.

- 5.2.7 While the current NPSs for energy infrastructure do not include policy specifically relating to H₂ infrastructure, they do include policy that is of relevance to the Proposed Development.

- 5.2.8 Part 4 of EN-1 sets out several '*assessment principles*' that must be taken into account by applicants and the SoS in preparing and determining applications for nationally significant energy infrastructure. General points include (paragraph 4.1.2) the requirement for the SoS, given the level and urgency of need for the infrastructure covered by the energy NPSs, to start with a presumption in favour of granting consent for applications for energy NSIPs. This presumption applies unless any more specific and relevant policies set out in the relevant NPS clearly indicate

that consent should be refused or any of the considerations referred to in Section 104 of the PA 2008 (noted above) apply.

- 5.2.9 Other assessment principles include the matters to be covered within any ES; the Habitats and Species Regulations; the consideration of alternatives; criteria for *'good design'*; grid connection; consideration of CCS; climate change adaptation; pollution control and environmental regulatory regimes; safety; hazardous substances; health; common law and statutory nuisance and security, amongst others.
- 5.2.10 Part 5 of EN-1 deals with the *'Generic Impacts'* of energy infrastructure. These include impacts that occur in relation to all or most types of energy infrastructure in addition to others that may only be relevant to certain technologies. Paragraph 5.1.2 stresses that the list of impacts is not exhaustive and that applicants should identify the impacts of their projects in the ES in terms of both those covered by the NPSs and others that may be relevant. Generic impacts include land use; socio economics; air quality and emissions; noise and vibration; dust, odour, artificial light, steam and smoke; traffic and transport; civil and military aviation; biodiversity and geological conservation; historic environment; landscape and visual; water quality and resources; flood risk and waste, amongst others. In relation to each of the generic impacts listed within Part 5, guidance is provided on how the Applicant should assess these within their application and the considerations that the SoS should consider in decision-making.
- 5.2.11 In addition to the assessment principles and generic impacts covered by EN-1, NPSs EN-4 and EN-5 set out the factors (e.g. those influencing site selection) and *'assessment and technology specific'* considerations to be considered in the preparation and assessment of applications for gas pipelines and electricity network infrastructure, including relevant environmental matters.

Draft Revised NPSs

- 5.2.12 Draft revised NPSs for energy infrastructure were published by the Government for consultation in September 2021, partly in response to the Government's legally binding commitment to achieve net zero in terms of GHG emissions by 2050. No date has been set for the designation of the revised energy NPSs. While the current suite of NPSs for energy infrastructure remain relevant Government policy and have effect for NSIP applications for the purposes of the PA 2008, it is considered that the draft revised NPSs are also a matter that is important and relevant to the Proposed Development. The following draft revised NPSs are relevant:
- Draft Overarching NPS for Energy (EN-1) (BEIS, 2021a);
 - Draft NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (BEIS, 2021b); and
 - Draft NPS for Electricity Networks Infrastructure (EN-5) (BEIS, 2021c).
- 5.2.13 Paragraph 1.3.3 of draft EN-1 states that where the need for a particular type of energy infrastructure set out in paragraph 1.3.2 is established by the NPS, but that type of infrastructure is outside the scope of one of the technology specific NPSs, EN-

1 will have effect alone and will be the primary basis for the SoS's decision making. It goes onto state that:

"This will be the case for, but is not limited to, hydrogen pipeline and storage infrastructure, Carbon Capture Storage (CCS) pipeline infrastructure and other forms of low carbon generation infrastructure not included in EN-2 or EN-3."

- 5.2.1 As confirmed at Section 1.0 of this EIA Scoping Report, on the 22nd December 2022, the SoS issued a Direction under Sections 35(1) and 35ZA that the Proposed Development is to be treated as development for which development consent is required. Paragraph 1.3.5 of draft EN-1 clarifies that EN-1, in conjunction with any relevant technology specific NPS, will be the primary policy for the SoS's decision making on projects in the field of energy for which a direction has been given under Section 35.
- 5.2.2 Draft revised EN-1 includes new policy in relation to H₂ infrastructure and confirms (paragraphs 3.4.11 to 3.4.15) that *"The government is committed to developing low carbon hydrogen, which will be critical for meeting the UK's legally binding commitment to achieve net zero by 2050, with the potential to help decarbonise vital UK industry sectors and provide flexible deployment across heat, power and transport"* and there is an *"urgent need for all types of low carbon hydrogen infrastructure"*.
- 5.2.3 It is noted that the Government will release updated drafts of the Energy National Policy Statements shortly after submission of this Scoping Report. These will be taken into account by the Applicant moving forward through development of the Proposed Development.
- 5.3 Marine Policy Statements & Plans
- 5.3.1 Section 104 of the PA 2008 requires the SoS to have regard to *"...the appropriate marine policy documents..."* relevant to the NSIP. It is considered that such documents would also be important and relevant considerations under section 105. A number of 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 (HM Government, 2011) and the North East Inshore and North East Offshore Marine Plan (Defra, 2021).
- UK Marine Policy Statement (March 2011)
- 5.3.2 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 Marine and Coastal Access Act 2009 and is intended to sit alongside terrestrial consenting regimes, including the PA 2008 regime. The MPS was subject to updates in September 2020 relating to how references to EU law should be interpreted from 1 January 2021 following the UK's withdrawal from the EU.

5.3.3 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 well-being of the UK. Paragraph 3.3.4 sets out issues that decision maker should consider when examining and determining applications for energy infrastructure. Those of relevance to the Proposed Development, which will connect to a Carbon Capture, Usage and Storage (CCUS) cluster in Teesside, include:

- The national level of need for new energy infrastructure, as set out in the Overarching NPS for Energy (EN-1);
- The positive wider environmental, societal and economic benefits of CCS as key technologies for reducing CO₂ emissions;
- That the physical resources and features that form oil and gas fields or suitable sites for CO₂ storage occur in relatively few locations and need first of all to be explored for and can then only be exploited where they are found; and
- The UK's programme to support the development and deployment of CCS clusters and in particular the need for suitable locations that provide for the permanent storage of CO₂.

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

5.3.4 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.

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

5.3.6 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.

5.3.7 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 East Coast Cluster 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.”

5.4 Energy and Climate Change Policy

5.4.1 Other matters that the SoS may consider important and relevant include recent UK energy and climate change policy.

5.4.2 The Proposed Development will support the overarching objective of the Government to continue transitioning the UK to a low carbon economy and meeting the legally binding target of net zero GHG emissions by 2050. The important role that H₂, coupled with CCS/ CCUS, has to play in achieving this transition is confirmed by recent Government energy and climate change policy including:

- The Ten Point Plan for a Green Industrial Revolution (HM Government, 2020);
- The Energy White Paper (BEIS, 2020);
- Industrial Decarbonisation Strategy (BEIS, 2021d);
- North Sea Transition Deal (BEIS, 2021e);
- UK Hydrogen Strategy (BEIS, 2021f);
- Net Zero Strategy: Build Back Greener (BEIS, 2021g); and
- British Energy Security Strategy (BESS) (HM Government, 2022).

5.4.3 These policy documents are considered below.

The Ten Point Plan for a Green Industrial Revolution (November 2020)

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

5.4.5 The Introduction to the Ten Point Plan (page 6) states:

“We will generate new clean power with offshore wind farms, nuclear plants and by investing up to half a billion pounds in new hydrogen technologies. We will use this energy to carry on living our lives, running our cars, buses, trucks and trains, ships and planes, and heating our homes while keeping bills low. And to the extent that we still emit carbon, we will pioneer a new British industry dedicated to its capture and return to under the North Sea. Together these measures will reinvigorate our industrial heartlands, creating jobs and growth, and pioneering world-leading SuperPlaces that unite clean industry with transport and power ...

The cumulative effect of this plan will be to reduce the UK emissions by 180 million tonnes of carbon dioxide equivalent (Mt CO₂ e) between 2023 and 2032, equal to taking all of today's cars off the road for around two years...." [our underlining]

- 5.4.6 The 'Ten Points' of the Plan are summarised at page 7. Point 2 'Driving the Growth of Low Carbon Hydrogen' is covered at pages 10 to 11 and states (page 10):

"Working with industry the UK is aiming for 5GW of low carbon hydrogen production capacity by 2030. Hubs where renewable energy, CCUS and hydrogen congregate will put our industrial 'SuperPlaces' at the forefront of technological development."

- 5.4.7 It highlights how 5 GW of low carbon H₂ production by 2030 could see the UK benefit from around 8,000 jobs across its industrial heartlands. This will be supported by a range of measures, including a £240 million Net Zero Hydrogen Fund. It goes onto state that (page 10):

"Producing low carbon hydrogen at scale will be made possible by carbon capture and storage infrastructure, and we plan to grow both of these new British industries side by side so our industrial 'SuperPlaces' are envied around the world." [our underlining]

- 5.4.8 Point 8 'Investing in Carbon Capture, Usage and Storage' (pages 22 and 23) identifies the ambition to capture 10 Mt of CO₂ a year by 2030 and the Government's commitment to invest up to £1 billion to support the establishment of CCUS in four industrial clusters in areas such as the North East and goes onto state how CCUS will be developed alongside H₂ production in these locations.

- 5.4.9 The Proposed Development will help deliver the Ten Point Plan by delivering low carbon H₂ production at scale within what is an emerging CCUS cluster on Teesside.

The Energy White Paper (December 2020)

- 5.4.10 The Energy White Paper 'Powering our Net Zero Future' ('EWP'), was presented to Parliament in December 2020 and builds on the Ten Point Plan. At the core of the EWP is the commitment to tackle climate change and achieve net zero. The EWP seeks to put in place a strategy for the wider energy system that transforms energy, supports a green recovery and creates a fair deal for consumers (page 4). As with the Ten Point Plan, the EWP confirms the Government's support for new H₂ technologies and CCUS drawing upon the resources provided by the North Sea.

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

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

"SUPPORT A GREEN RECOVERY FROM COVID-19 ...

- *Increasing the ambition in our Industrial Clusters Mission four-fold, aiming to deliver four low-carbon clusters by 2030 and at least one fully net zero cluster by 2040.*
- *Investing £1 billion up to 2025 to facilitate the deployment of CCUS in two industrial clusters by the mid-2020s, and a further two clusters by 2030, supporting our ambition to capture 10 Mt per year by the end of the decade.*
- *Working with industry, aiming to develop 5GW of low-carbon hydrogen production capacity by 2030.* [our underlining]

5.4.13 Chapter 2 'Power' of the EWP set out how it is proposed to decarbonise the power sector the generation of electricity. This includes a commitment to consult on steps to ensure that new thermal plants can convert to low carbon technologies either through the retrofit of carbon capture plant or "...conversion to firing clean hydrogen" (page 48).

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

"...will:

- *Create a sustainable future for UK manufacturing industry through improved energy efficiency and the adoption of clean energy technologies*
- *Establish the UK as a world leader in the deployment of CCUS and clean hydrogen, supporting up to 60,000 jobs by 2030.* [our underlining]

5.4.15 The EWP confirms that manufacturing and refineries, which form the bulk of industrial emissions, still account for around 1% of the UK's GHG emissions. About half of those emissions are concentrated in the UK's six major industrial clusters. This includes Teesside (Figure 8.1, page 121) which accounts for 3.9 Mt CO_{2e} of emissions (2018 figures).

5.4.16 To transform industrial energy, the EWP (page 122) states that we cannot rely on energy efficiency alone to reduce emission in line with the Government's 2050 goal. Manufacturing industry will also need to capture its carbon for onward transport and storage and switch from using fossil fuels to low-carbon alternatives, such as H₂.

5.4.17 To bring about change in the industrial, the EWP includes a commitment (page 124) to increase the 'Industrial Clusters Mission' to support the delivery of four low-carbon industrial clusters by 2030 and at least one fully net zero cluster by 2040. The EWP states that the Government will focus on the UK's industrial clusters:

“... centres where related industries have congregated and can benefit from utilising shared clean energy infrastructure, such as CCUS and low-carbon hydrogen production and distribution. Decarbonisation in clusters will enable economies of scale, reducing the unit cost for each tonne of carbon abated, while clusters provide high quality jobs which tend to pay above the UK average wage.” [our underlining]

- 5.4.18 The EWP notes (page 124) that many clusters are in regions in need of economic revitalisation and that decarbonising those clusters can act as a driver of prosperity for the surrounding areas. Furthermore, that investments in key technologies like CCUS and H₂, will be crucial to enhancing local economic growth and creating jobs together with prosperity.
- 5.4.19 Chapter 5 of the EWP includes a section on ‘Clean Hydrogen’ (pages 127 to 128). It identifies that H₂ will be critical in reducing emissions from heavy industry, as well as in power, heat and transport. Clean H₂ includes using natural gas and capturing the CO₂ by-product with CCUS or using renewable electricity to split water into H₂ and O₂. It includes commitments to:
- work with industry to develop 5 GW of low-carbon H₂ production capacity by 2030; and
 - create a Net Zero Hydrogen Fund to support low-carbon H₂ production, providing £240 million of capital co-investment out to 2024/25.
- 5.4.20 The EWP underlines (page 128) that a variety of H₂ production technologies will be required to satisfy the level of anticipated demand for clean H₂ by 2050 and that the Government hopes to see 1GW of H₂ production capacity by 2025 on route to its 2030 goal.
- 5.4.21 The Proposed Development is clearly consistent with commitments in the EWP to deliver low carbon H₂ production at scale, coupled with CCUS, within one (Teesside) of the UK’s major industrial clusters.

Industrial Decarbonisation Strategy (March 2021)

- 5.4.22 The Industrial Decarbonisation Strategy is the first strategy published by a major economy, which sets out how industry can be decarbonised in line with net zero, while remaining competitive and without pushing emissions abroad. It builds on the Ten Point Plan and sets out the Government’s vision for a prosperous, low carbon UK industrial sector by 2050, and aims to provide industry with the long-term certainty it needs to invest in decarbonisation.
- 5.4.23 The Ministerial Foreword (page 6) emphasises that the 2020s will be crucial to industrial decarbonisation, with the UK needing to deploy key technologies such as CCUS while beginning the journey of switching from fossil fuel combustion to low carbon alternatives such as H₂.
- 5.4.24 Chapter 1 ‘*Why we need a strategy and our approach*’ sets out the Government’s ambition for decarbonising industry in line with net zero. The expectation is that emissions will need to reduce by at least two-thirds by 2035 and by at least 90% by

2050, with 3 Mt CO₂ per annum captured through CCUS and a significant switching to low carbon fuels such as H₂ by 2030. Significantly, the Strategy (page 18) recognises that government should play a key role in the delivery of large infrastructure projects for key technologies such as H₂ networks where there is a sharing of benefits, and the risk or cost is too great for the private sector.

- 5.4.25 Chapter 2 'Getting investors to choose low carbon' confirms the Government's commitment (Action 2.2) to put in place funding mechanisms to support the deployment and use of CCUS and low carbon H₂ infrastructure. It states that (pages 29-30):

"CCUS will be crucial to reaching net zero, and low carbon hydrogen has the potential to play a key role in enabling the economic transformation of the UK's industrial regions. With both technologies at early stages of development, government will need to play an active role in overcoming market failures; sharing the risk and costs of scaling up deployment of both CCUS and low carbon hydrogen.

.... We have already committed to a £1 billion CCS Infrastructure Fund to provide industry with certainty to deploy CCUS at pace and scale, alongside a £240 million Net Zero Hydrogen Fund. Later in 2021 will bring forward further details of the revenue mechanism to support business models for both industrial carbon capture and low carbon hydrogen projects." [our underlining]

- 5.4.26 With regard to fuel switching (Action 4.2, pages 51 and 52), Chapter 4 of the Strategy confirms that the Government is committed to developing a low carbon H₂ economy in the UK. The Government sees it as critical to demonstrate fuel switching to H₂ in industrial sites in parallel to ramping up low carbon H₂ production.
- 5.4.27 The Proposed Development will make a significant contribution to industrial decarbonisation in the UK through the production of and supply of low carbon H₂ to a number of industrial users/offtakers on Teesside.

North Sea Transition Deal (March 2021)

- 5.4.28 The North Sea Deal is a transformational sector deal for the offshore oil and gas sector in recognition of the key role that it can play in helping the UK meet its net zero commitments. The document recognises (Foreword, page 6) that with declining output of hydrocarbons from the UK Continental Shelf ('UKCS') and a projected decline in domestic demand, there is a clear need for determined action to be taken to build on the proven capabilities and skills within the existing sector to support the transition to net zero. It continues:

"The UK already has the capability and skills within the existing sector to lead in new and emerging energy technologies such as Carbon Capture, Usage and Storage (CCUS) and the hydrogen economy as well as to support the growth of new sectors such as offshore wind.

... Delivering large-scale decarbonisation solutions will strengthen the position of the existing UK energy sector supply chain in a net zero world, securing new high-value jobs in the UK, supporting the development of regional economies and competing in clean energy export markets.” [our underlining]

5.4.29 The Executive Summary (page 8) states that the North Sea Deal is aimed at delivering on the commitments set out in the oil and gas chapter of the EWP and is closely aligned with the Prime Minister’s Ten Point Plan. It seeks to do this through the implementation of several commitments and measures, including supporting up to 40,000 direct and indirect supply chain jobs in decarbonising UKCS production and the CCUS and H₂ sectors.

5.4.30 The Deal is built on five key outcomes – supply decarbonisation; CCUS; H₂; supply chain transformation; and people and skills. These are seen as being closely interlinked, meaning that they must be delivered as an integrated whole for the Deal to achieve its full potential. With regard to H₂, the Deal notes that:

“Hydrogen is essential to meeting our net zero commitment in the UK. It could provide a clean source of energy across the economy, from industrial and domestic heat, to heavy transport, and flexible power and energy storage. The UK already has world-leading offshore wind potential and electrolyser capability, alongside unparalleled CCS sites that the UK can maximise to scale up low carbon hydrogen production.

The hydrogen commitment in the North Sea Transition Deal focuses on creating the economic environment in which low carbon hydrogen production can flourish. This will help unlock billions of pounds of investment from the sector. The oil and gas sector is positioned to enable the production of low-carbon hydrogen at scale as part of a long-term competitive market, supporting the UK’s ambition to deliver 5 GW of low carbon hydrogen production capacity by 2030.”

5.4.31 The Proposed Development is well placed to support the commitments set out in the North Seas Transition Deal, being able to link into NZT (part of the East Coast Cluster), which will make use of offshore skills, capabilities and resources.

UK Hydrogen Strategy (August 2021)

5.4.32 The UK Hydrogen Strategy sets out the Government’s approach to developing a thriving low carbon H₂ sector in the UK to meet its ambition for up to 5 GW of low carbon H₂ production capacity by 2030.

5.4.33 Chapter 1 ‘The case for low carbon hydrogen’ confirms that low carbon H₂ will be critical for meeting the UK’s legally binding commitment to achieve net zero by 2050 and Carbon Budget Six in the mid-2030s. H₂ can support the deep decarbonisation of the UK economy, particularly in the “hard to electrify” UK industrial sectors, and can provide greener, flexible energy across power, heat and transport (page 7). It goes onto state (page 8):

“Today most hydrogen produced and used in the UK and globally is high carbon, coming from fossil fuels with no carbon capture; only a small fraction can be called low carbon. For hydrogen to play a part in our journey to net zero, all current and future production will need to be low carbon.”

- 5.4.34 Section 1.3 of Chapter 1 ‘*The UK’s hydrogen opportunity*’ sets out the Government’s ‘*twin track*’ approach to H₂ production, which seeks to capitalise on the UK’s potential to produce large quantities of both electrolytic ‘green’ and CCUS enabled ‘blue’ hydrogen. It states that the UK has the technology, know-how and storage potential to scale up CCUS across the country, unlocking new routes to CCUS-enabled H₂ production (page 10). It goes onto state (Page 10):

“Early deployment of CCUS technology and infrastructure will likely be located in industrial clusters. Many of these are in coastal locations, with important links to CO₂ storage sites such as disused oil and gas fields. Government aims to establish CCUS in four industrial clusters by 2030 at the latest, supporting our ambition to capture 10 Mt/ CO₂ per annum.

In turn, industrial clusters and wider industry are significant potential demand centres for low carbon hydrogen. Today, numerous industrial sectors from chemicals to food and drink are exploring the role that hydrogen can play in their journey to net zero. UK Research and Innovation’s (UKRI’s) Industrial Decarbonisation Challenge provides up to £170 million – matched by £261 million from industry – to invest in developing industrial decarbonisation infrastructure including CCUS and low carbon hydrogen. [our underlining]

- 5.4.35 Figure 1.3 at Chapter 1 of the Strategy identifies Teesside as a location for both green and blue (CCUS-enabled) H₂ production (page 11).

- 5.4.36 The Strategy (page 33) highlights to potential of CCUS-enabled blue H₂ production, stating:

“Our Hydrogen Production Cost 2021 report suggests that, under central fuel price assumptions, CCUS-enabled methane reformation is currently the lowest cost low carbon hydrogen production technology. Given the potential production capacity of CCUS-enabled hydrogen plants, we would expect this route to be able to deliver a greater scale of hydrogen production as we look to establish a UK hydrogen economy during the 2020s.”

- 5.4.37 The Strategy considers the ‘*Use of hydrogen in industry*’ (pages 52 and 53) stating:

“It is clear that UK industrial sectors will play a vital role in developing a hydrogen economy over the next decade. Industry produced 16 per cent of UK emissions in 2018, and hydrogen will be critical to decarbonise industrial processes that would be hard to abate with CCUS or electrification. The Industrial Decarbonisation Strategy published earlier this year sets out the policy and technology principles to

decarbonise industry by 2050, including the installation of deep decarbonisation infrastructure such as hydrogen and CCUS networks in the 2020s.

Our industrial heartlands will likely lead the way for large scale low carbon hydrogen supply, and industrial users are expected to provide the most significant new demand for hydrogen by 2030 through industrial fuel switching. Today's hydrogen economy will need to scale up from its current base in the oil refining and chemical sectors, to enter other parts of industry and the wider energy system. We will develop policy to support and deliver this change, and to drive the decarbonisation of existing industrial hydrogen use." [our underlining]

- 5.4.38 Since the UK Hydrogen Strategy was published, the British Energy Security Strategy (April 2022) has doubled the UK's H₂ production ambition from 5 GW to 10 GW by 2030. This is reflected in the latest '*Hydrogen Strategy update to the market*' issued to BEIS in December 2022. The Hydrogen Strategy update to the market also includes the announcement on shortlisted hydrogen projects in the BEIS Phase 2 Cluster Sequencing Process (Cluster sequencing Phase-2: shortlisted projects (power CCUS, hydrogen and ICC), August 2022)), which identifies H2Teesside as one of the shortlisted projects to have moved to the due diligence stage of the process.

Net Zero Strategy: Build Back Greener (October 2021)

- 5.4.39 The '*Net Zero Strategy: Build Back Greener*' expands on key commitments in the Ten Point Plan and the EWP and sets out the next steps the Government proposes to take to cut emissions, seize green economic opportunities and leverage further private investment into net zero. The Strategy sets an indicative delivery pathway for emissions reductions to 2037 by sector. It is intended to put the UK on the path for Carbon Budget 6 and ultimately on course for net zero by 2050.
- 5.4.40 Regarding power, the Strategy states that the UK will fully decarbonise its power system by 2035 subject to security of supply. It states that the power system will consist of abundant, cheap renewables, cutting edge new nuclear power stations, underpinned by flexibility including storage, gas with CCUS and H₂ (page 19).
- 5.4.41 For industry, the Net Strategy states (page 21) that it will deliver four CCUS clusters, capturing 20-30 Mt CO₂ across the economy, including 6 Mt CO₂ of industrial emissions, per year by 2030. This will be done by supporting industry to switch to cleaner fuels, such as low carbon H₂ alongside renewable energy and CCUS. These clusters, including the East Coast Cluster, which includes NZT, could have the opportunity to access support under the Government's CCUS programme (£1 billion). The Strategy also states that the Government has set up the Industrial Decarbonisation and Hydrogen Revenue Support Scheme, providing up to £140 million to fund new H₂ and industrial carbon capture business models. This is in addition to £240 million Net Zero Hydrogen Fund.
- 5.4.42 Whilst the Net Zero Strategy was the subject of a successful Judicial Review, the Court's decision did not quash the Strategy, but instead ordered the Government to

provide an update to that strategy in March 2023 to add further explanation as to how the Government's aims set out in the Strategy would be met.

British Energy Security Strategy (April 2022)

- 5.4.43 The BESS was published largely in response to soaring energy prices as a result of a sudden surge in demand following the Coronavirus (COVID-19) pandemic, compounded by the Russian invasion of Ukraine. Much of the focus of the strategy is upon providing financial assistance to families and businesses struggling with higher energy bills, but it also looks at improved energy efficiency, reducing the amount of energy we need and addressing the underlying vulnerability to international oil and gas prices by reducing the UK's dependence on imported oil and gas.
- 5.4.44 Notably, the BESS identifies the importance of low carbon H₂, with an increased commitment to achieve up to 10 GW of H₂ production by 2030, including CCUS-enabled blue H₂.
- 5.5 National Planning Policy Framework
- 5.5.1 The NPPF (MHCLG, 2021), introduced in March 2012 (last updated July 2021), sets out the Government's planning policies for England. It is a material consideration in planning decisions. Although paragraph 5 of the NPPF confirms that NSIPs are to be determined in accordance with the decision-making framework of the PA 2008 and relevant NPSs, decisions on NSIPs should also take account of any other matters that are "*relevant*", which may include the NPPF. The NPPF is supported by the Planning Practice Guidance (PPG), which provides more detailed guidance on various aspects of planning.
- 5.5.2 Section 2 '*Achieving sustainable development*' confirms (paragraph 7) that the purpose of the planning system is to contribute to the achievement of sustainable development, summarised as "*meeting the needs of the present without compromising the ability of future generations to meet their own needs*". Paragraph 8 goes on to identify three overarching objectives to the achievement of sustainable development, which are interdependent and need to be pursued in mutually supportive ways. These are:
- an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
 - a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and

- an environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
- 5.5.3 Central to the NPPF is “*the presumption in favour of sustainable development*”. This is set out at Paragraph 11. For decision-making, this means approving applications that accord with the development plan without delay.
- 5.5.4 The NPPF is supportive of infrastructure projects. One of the methods of fulfilling the objective of sustainable development listed at paragraph 8 under ‘a) an economic objective’ is through the “*provision of infrastructure*”.
- 5.5.5 Paragraph 152 in Section 14 ‘*Meeting the challenge of climate change, flooding and coastal change*’ states:
- “The planning system should support the transition to a low carbon future in a changing climate ... it should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure”.* [underlining added]
- 5.5.6 Paragraph 158 states that when determining application for renewable and low carbon development, there should be no requirement for applicants to demonstrate the overall need for renewable or low carbon energy and that applications for renewable or low carbon development should be approved if their impacts are (or can be made) acceptable.
- 5.5.7 NPPF policies of particular relevance include:
- building a strong, competitive economy;
 - making effective use of land;
 - meeting the challenge of climate change, flooding and coastal change; and
 - conserving and enhancing the natural environment.
- 5.5.8 A summary of those policies is provided in Table 5-1 below.

Table 5-1: Relevant National Planning Policy Framework Policies

POLICY	POLICY SUMMARY
Chapter 6 – Building a strong, competitive economy	Confirms that the Government is committed to securing economic growth and productivity and allowing each area to build on its strengths, counter any weaknesses and address the challenges of the future. Paragraphs 81 and 82 make it clear that the planning system should do all it can to support sustainable economic growth though, amongst other measures, planning

POLICY	POLICY SUMMARY
	proactively and removing barriers to investment such as a lack of infrastructure.
Chapter 11 – Making effective use of land	Aimed at promoting the effective use of land, including by (paragraph 120c) giving substantial weight to the use of suitable brownfield land.
Chapter 14 – Meeting the challenge of climate change, flooding and coastal change	Focuses upon adapting to and mitigating the effects of climate change. Paragraph 152 highlights that planning plays a key role in helping shape places to secure radical reductions in GHG emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy. Paragraph 159 warns that inappropriate development in areas at risk of flooding should be avoided but where it is necessary the development should be made safe for its lifetime without increasing flood risk elsewhere. If it is not possible for development to be in zones with a lower risk of flooding the exception test may have to be applied.
Chapter 15 – Conserving and enhancing the natural environment	Aimed at protecting and enhancing value landscapes, recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital, minimising impacts on and providing net gains for biodiversity and preventing new and existing development from contributing to, being put at unacceptable risk from or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability.

5.5.9 The above NPPF policies will be considered in detail within the Planning Statement.

5.5.10 The Government has launched a consultation on proposed reforms to National Planning Policy. A revised NPPF is expected to be published in Spring 2023. The Planning Statement will consider any policy changes within the revised NPPF of relevance to the Proposed Development.

5.6 Local Planning Policy

Development Plan Documents

5.6.1 Both Main Site (A and B) are located within the administrative boundary of RCBC.

5.6.2 The hydrogen pipelines and other connections involve crossings of the River Tees and encompass land within the administrative boundaries of RCBC, STBC and HBC.

5.6.3 The relevant Development Plan Documents (DPDs) for the Proposed Development Site are therefore as follows:

- the Redcar & Cleveland Local Plan and Policies Map (adopted May 2018; RCBC, 2018a);
- Stockton-on-Tees Borough Council Local Plan (adopted January 2019; STBC, 2019);

- Hartlepool Local Plan (adopted May 2018; HBC, 2018); and
- The Tees Valley Joint Minerals and Waste DPDs (adopted September 2011; Darlington Borough Council *et al.*, 2011).

5.6.4 The Tees Valley Joint Minerals and Waste DPDs comprise a Minerals and Waste Core Strategy DPD and a Minerals and Waste Policies and Sites DPD. The Joint Minerals and Waste DPDs were prepared together by RCBC, STBC, HBC and Darlington and Middlesbrough Councils. The Joint Minerals and Waste DPD is of limited relevance to the Proposed Development.

Supplementary Planning Documents

5.6.5 Parts of the Proposed Development Site lie within the boundary of the South Tees Development Corporation (STDC) area, which is now known as Teesworks. STDC is a Mayoral Development Corporation, established to further the economic development of the South Tees Area through physical, social and environmental regeneration, however, RCBC retains planning powers for the area and continues to act as the LPA in respect of planning policy and development management and the processing and determination of planning applications.

5.6.6 STDC has produced a Master Plan (the 'South Tees Regeneration Master Plan') to provide a flexible framework for the regeneration of the Teesworks/South Tees Area. The Master Plan was prepared throughout 2017 (later revised in 2019 as STDC (2019)) as a supporting visioning and development strategy document to inform the preparation of a Supplementary Planning Document (SPD) by RCBC for the South Tees Area. Following consultation, the Master Plan was launched alongside the South Tees Area SPD, which was formally adopted by RCBC in May 2018 (RCBC, 2018b).

Planning Allocations/ Designations

5.6.7 The key planning allocations/designation and related development plan policies (based upon the relevant policies maps) and relevant SPD designations and policies that apply to the Proposed Development Site within the administrative areas of RCBC, STBC and HBC are listed below.

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

- Development Limits – Policy SD3;
- Protected Employment Area – Policy ED6;
- South Tees Development Corporation Area – Policy LS4;
- 30 km wind farm safeguarding area for Durham Tees Valley Airport – Policy SD6;
- Sensitive Landscape Areas – Policy N1;
- Restoration Landscape Areas – Policy N1;
- Strategic Landscape Areas – Policy N2;
- Special Protection Areas (SPAs) – Policy N4;

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- Sites of Special Scientific Interest (SSSIs) – Policy N4;
 - 6 km SPA Buffer Zone – Policy N4;
 - Local Wildlife Sites – Policy N4;
 - Marine Dredged Sand and Gravel – Policies MWC4 and MWC5;
 - General Location for Large Waste Management Facilities – Policy MWC8;
 - South Tees Eco Park – Policies MWP8 and MWP10(b); and
 - Safeguarded Wharves – Policy MWC11.
- 5.6.9 Figure 2 of the South Tees SPD shows indicative clusters for key industries and processes within the South Tees Area. Main Sites A and Main Site B are identified as clusters for manufacturing, manufacturing and energy, while within their vicinity clusters are shown for port-related uses, bulks and other processing, advanced manufacturing and training, testing and research.
- 5.6.10 The SPD divides the South Tees Area into five main development zones (as shown by Figure 6 of the SPD). These are the North Industrial Zone; North East Industrial Zone; Central Industrial Zone; South Industrial Zone; and Coastal Community Zone. The North Industrial Zone, which encompasses the Main Sites A and B, is identified for development proposals relating to port related industry, major space users/large scale manufacturing, energy innovation, power generation and storage, bulk materials and mineral processing.
- 5.6.11 The SPD sets out several '*Development Principles*' to guide the development of the Teesworks/South Tees Area. Those of particular relevance to the Proposed Development include:
- Development Principle STDC6: Energy Innovation;
 - Development Principle STCD7: Natural Environmental Protection and Enhancement;
 - Development Principle STDC10: Utilities; and
 - Development Principle STDC11: North Industrial Zone.
- 5.6.12 Development Principle STDC6 '*Energy Innovation*' (pages 33 to 34) supports new energy generation within the area, including the promotion of renewable energy and innovative energy projects. STDC11 '*North Industrial Zone*' states that STDC will encourage development proposals relating to port related industry, major space users/large scale manufacturing, energy innovation, power generation and storage and bulk materials and processing within this area.
- 5.6.13 Key planning allocations/designations and related development plan policies for the STBC administrative area are:
- Development Limits – Policies SD2, SD3, SD4 and SD5;
 - General Employment Allocation/Locations – Policies SD4 and EG1;
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- Employment Areas/Specialist Use Locations – Policies SD4 and EG4;
 - Reserve Housing Land – Policies H1 and H2;
 - Durham Tees Valley Airport Safeguarding Area – Policy EG5;
 - Internationally Designated Sites (SPAs and Ramsar sites) – Policies SD5 and ENV5;
 - Nationally Designated Sites (SSSIs) – Policies SD5 and ENV5;
 - Locally Designated Sites (Local Nature Reserves) – Policies SD5 and ENV5;
 - Locally Designated Sites (Local Wildlife Sites) – Policies SD5, ENV5; and
 - Open Space – Policies SD5 and ENV5.
- 5.6.14 Key planning allocations/designations and related development plan policies for the HBC administrative area are:
- Development Limits – Policies LS1 and RUR2;
 - Strategic Gaps – Policy LS1;
 - Underground Storage – Policy EMP6;
 - Safeguarded Land for Future Road Schemes – Policy INF2;
 - Internationally Designated Sites – Policy NE1a; and
 - Local Wildlife Sites – Policy NE1c.
- 5.6.15 The above policies and development principles, and how the Proposed Development complies with them, will be considered in detail within the Planning Statement that will form part of the application for development consent.
- Summary
- 5.6.16 The current NPSs confirm the need that exists for new energy infrastructure and are the key basis for decision-making by the SoS on development consent applications.
- 5.6.17 Although the current NPSs do not contain policies that specifically relate to H₂ infrastructure, they do contain policy that is relevant to the Proposed Development, while the draft revised NPSs include new policy in relation to H₂ infrastructure, which confirms (paragraphs 3.4.11 to 3.4.15) that *“The government is committed to developing low carbon hydrogen, which will be critical for meeting the UK’s legally binding commitment to achieve net zero by 2050, with the potential to help decarbonise vital UK industry sectors and provide flexible deployment across heat, power and transport”* and there is an *“urgent need for all types of low carbon hydrogen infrastructure”*.
- 5.6.18 While the NPSs are the key basis for decisions by the SoS on development consent applications, the SoS can take account of any other matters that are both important and relevant to their decision. It is considered that such matters include recent Government energy and climate policy.
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- 5.6.19 The energy and climate change policy considered in this chapter underlines the important role that H₂, coupled with CCUS, has to play in achieving the UK's transition to a low carbon economy and the Government's legally binding target of net zero GHG emissions by 2050. In particular, H₂ is identified as being critical to the decarbonisation of industries that are hard to electrify.
- 5.6.20 The Proposed Development is well placed to support large-scale industrial decarbonisation, being in one of the UK's major industrial clusters, with the potential to supply H₂ to a number of industrial users/offtakers, while linking into the NEP infrastructure for the transportation and storage of the CO₂ generated during the H₂ production process.
- 5.6.21 Other important and relevant matters can include the NPPF and local planning policy.
- 5.6.22 The application for development consent will include a Planning Statement that will set out in more detail the policy of relevance to the Proposed Development and include an assessment of how it complies with that policy.

6.0 POTENTIALLY SIGNIFICANT ENVIRONMENTAL EFFECTS

6.1 Introduction

6.1.1 The following sections present a discussion of the potential environmental effects associated with the Proposed Development and the topics proposed to be included as part of the EIA.

6.1.2 Each topic section has outlined the baseline conditions as well as the scope of assessment proposed based on the information currently available for the Proposed Development. The baseline sections are not intended to include a full baseline review at this stage but a summary of the main points. Some sections will be more detailed than others at this stage. However, a detailed baseline data review will be carried out for all topics as the EIA progresses and will be included within the PEI Report and subsequent ES.

6.1.3 Effects during construction, operation and decommissioning will be assessed. As identified at Section 3.18, it is often the case that sufficient information is not available at the time of assessment to inform an assessment of decommissioning impacts. However, it is generally assumed that the environmental effects associated with the decommissioning phase would be no worse than those experienced during construction and these will be assessed on this basis.

6.1.4 Please note that the baseline and scope of assessment sub-sections below are applicable to both Main Sites and the associated connection corridors unless clearly stated otherwise.

6.2 Air Quality

Baseline Conditions

6.2.1 The Environment Act 1995 requires local authorities to review air quality within their district or borough to determine where pollutant levels identified in the Air Quality Framework Directive may be in excess of the standards.

6.2.2 If pollutant levels in an area are likely to exceed statutory objectives, then local authorities must declare an Air Quality Management Area (AQMA) and draft an Air Quality Action Plan (AQAP) to achieve the statutory objectives. The Department of Environment, Food and Rural Affairs (Defra) has issued technical guidance to local authorities to assist in undertaking this task.

6.2.3 The most recent publication within the above framework is the '2022 Air Quality Annual Status Report' (RCBC, 2022).

6.2.4 There are no AQMAs designated within the administrative boundary of RCBC or the adjoining local authority areas of HBC and STBC. The nearest AQMA is located over 20 km away from the Proposed Development Site and will be outside of the Study Area for Air Quality. As outlined in '2022 Air Quality Annual Status Report' (RCBC, 2022), the Proposed Development Site is not within a smoke control area.

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- 6.2.5 RCBC conducts local air quality monitoring for NO₂, PM₁₀ and PM_{2.5} (RCBC, 2022). At all locations where air quality monitoring is conducted, all pollutant concentrations are well below the relevant objectives.
- 6.2.6 In addition to these monitoring sites, AECOM has undertaken a three-month project specific diffusion tube monitoring survey for baseline NO₂ to establish existing concentrations within the area and adjacent to the road network surrounding the Proposed Development Site. Following completion of the survey, the results were annualised to correct for seasonal variation and make them representative of the whole year.
- 6.2.7 The AECOM survey recorded NO₂ concentrations which exceeded the NO₂ annual mean objective at two measurement sites (DT2 and DT6); DT2 is located approximately 1.4 km and 2.3 km south-east of Main Sites A and B respectively, and DT6 is located approximately 3.5 km and 4 km south-east of Main Sites A and B respectively. However, the locations with elevated NO₂ concentrations were situated in close proximity to major traffic routes, away from residential areas. These measurement sites are locations where people are not regularly present over the length of time represented by the annual mean air quality objective value for NO₂. Therefore, it can be assumed that there is no relevant human exposure at these locations. At residential areas near to these sites and elsewhere, where humans would be expected to be regularly present, the survey has recorded annual mean concentrations which are well within the annual mean NO₂ objective.
- 6.2.8 In addition to the three-month baseline survey carried out in 2021, a further three-month survey is programmed to be carried out during 2023. The purpose of the second survey is to obtain more data at locations where the original survey dataset was incomplete due to missing tubes, in addition to obtaining a longer period of monitoring throughout the study area. The update will focus on the same locations surveyed in the initial measurement period. However, a review of the monitoring sites will be conducted prior to deployment, to consider the measurement locations in the context of the latest proposed development plans.
- 6.2.9 If not appropriately controlled, emissions from the operation of the Proposed Development could potentially affect the health of the residents of residential areas in closest proximity to the Proposed Development Site. Emissions from road traffic could also affect human health at residential properties adjacent to traffic routes used by vehicles accessing the Proposed Development Site. Long-term impacts on ambient pollutant concentrations and the deposition of nutrient nitrogen and acid to ground could adversely affect sensitive ecosystems.
- 6.2.10 There are no substantive differences in the baseline conditions between Main Site A and Main Site B, therefore the baseline conditions as outlined above apply and are relevant to both. The baseline data will be used in the air quality assessment of both human health and ecological receptors.

Scope of the Assessment

6.2.11 There are a number of potential emissions to air that may be associated with the Proposed Development. These emission sources are summarised in the following sections.

Construction and Operational Emissions from Vehicles

6.2.12 During the construction and operational phases of the Proposed Development, there is the potential for changes in traffic flows on the surrounding road network due to additional vehicles accessing the Proposed Development Site. This additional traffic could give rise to an effect on local air quality in the vicinity of nearby air quality sensitive receptors, which are currently within the air quality objective values.

6.2.13 The assessment of road traffic emissions will be based on criteria set out in guidance published by the Institute for Air Quality Management (IAQM) (2017) or National Highways (LA105, 2022), on the requirement to undertake a detailed assessment of road traffic emissions.

6.2.14 As operational amounts of daily traffic are predicted to be well-below these screening criteria of 500 Light Duty Vehicles or 100 Heavy Duty Vehicles per day, as set out in the IAQM guidance document Land-Use Planning & Development Control Guidance (IAQM, 2017), the operational impacts of traffic have been scoped out of this assessment.

6.2.15 As outlined in Section 6.9: Traffic and Transportation, a construction traffic assessment shall be conducted. After this has been completed, this data will be screened against the relevant criteria to scope the need for detailed modelling in or out of the assessment. Where the need for a detailed assessment is considered necessary, concentrations of NO₂ and particulate matter (PM₁₀ and PM_{2.5}) at sensitive receptors due to changes traffic flows on the surrounding road network will be predicted using the ADMS Roads dispersion modelling software package. Data collected during the project-specific baseline NO₂ survey will be used to verify the performance of the model against measured values.

Construction Dust and Mobile Plant

6.2.16 Construction phase dust impacts, and the level of recommended mitigation will be qualitatively assessed based on the framework approach outlined in the IAQM guidance for construction dust (IAQM, 2016). The aim of such an assessment is to identify the recommended level of best practice mitigation required for the construction activities (including in design, dust monitoring and management of the Proposed Development Site) such that residual impacts are considered to be insignificant, using a risk-based approach. This risk-based approach will identify the unmitigated risk of dust impacts at human health and amenity receptors within 350m of the Proposed Development Site and ecological receptors within 50m of the Proposed Development Site. Dust associated with construction vehicles on the road network will also be considered for receptors within 50 m of roads, up to 500 m from the Proposed Development Site.

6.2.17 In addition to construction dust, the use of Non-Road Mobile Machinery (NRMM), such as mechanical excavators and earthmovers or mobile machinery, and generators, also have the potential to increase NO₂ and PM₁₀ concentrations locally,

when in use within the construction site boundary. According to IAQM guidance (IAQM, 2014), experience of assessing the exhaust emissions from on-site plant (NRMM) and onsite traffic suggests that they are unlikely to have a significant effect on local air quality, due to the intermittent nature of their use within the confinement of the Proposed Development Site. Therefore, in most cases, they do not need to be quantitatively assessed. In this case, given the distance between the Main Sites and the nearest residential property (Marsh House Farm/Marsh Farmhouse, located approximately 1.3km and 2.2km to the east of Main Sites A and B respectively), emissions from on-site plant during construction are unlikely to generate a significant risk of effects on local air quality for either human health or ecological receptors.

- 6.2.18 Emissions from NRMM associated with the Proposed Development would be temporary and localised and would be controlled via the application of appropriate emissions standards and through best-practice mitigation measures, as listed within the CEMP for the Proposed Development. For that reason, construction phase NRMM emissions are highly unlikely to be significant and, have been scoped out of this assessment.

Operational Emissions from the Production Facility

- 6.2.19 Potential emission points to air from the Proposed Development once it is operational include:
- the direct fired heater;
 - venting from the process condensate drum, via the flare stack during normal operation;
 - disposal of process material via the flare stack during an emergency event;
 - auxiliary boiler;
 - emergency diesel generators; and
 - an emergency CO₂ vent.
- 6.2.20 The main pollutants that could be released from these emission sources would be Nitrogen Oxides (NO_x), Sulphur Oxides (SO_x), CO, particulates and NH₃.
- 6.2.21 Of the sources listed above, the natural gas fuelled direct fired heater, the auxiliary boiler and the condensate flare drum vent would be assumed at this stage to operate on a continuous basis.
- 6.2.22 The operation of the flare and diesel generators would only take place during an emergency situation and or abnormal circumstances and during testing.
- 6.2.23 In addition to the emission sources listed above, there would be some emissions to air from fugitive sources. These releases would be small scale and readily diluted and would consist only of water vapour, N₂, O₂, H₂, CH₄ and CO₂ and will not require consideration within the EIA as they will be insignificant.
- 6.2.24 The impact of operational process emissions will be considered quantitatively using the ADMS dispersion modelling software package, at both human health and

sensitive ecological receptor locations. The impact of emission sources that are continuously operational will be assessed at both national and international designated ecological receptors within up to 15 km of the Proposed Development Site.

- 6.2.25 It is considered that the operation of the hydrogen pipeline, natural gas connection, electrical connection and water connections would be unlikely to result in significant effects in terms of emissions to air and, therefore an assessment of operational impacts of these parts of the Proposed Development has been scoped out of the assessment.
- 6.2.26 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.3 Surface Water, Flood Risk and Water Resources

Baseline Conditions

Topography, Land-Use and Climate

- 6.3.1 Both Main Site A and Main Site B are characterised by the flat, low-lying coastal topography. Main Site A has typical ground levels of approximately 6-8 m AOD. Main Site B has typical ground levels of approximately 2-7m AOD. Ground levels for the majority of Main Site B are approximately 5-7m AOD; the north-western corner of Main Site B is lower at approximately 2 m AOD.
- 6.3.2 The land use of the surrounding areas to the south and west of the Proposed Development Site is predominantly industrial, around the River Tees. The average rainfall varies throughout the year, with the wettest period being in the late summer to autumn, and driest in late winter to early spring. Average monthly rainfall is generally less than 60 mm throughout the year, except in August and November when it is between 60 mm and 65 mm. February is the driest month with an average of approximately 33 mm between 1981 and 2010.

Surface Waterbodies and Features

- 6.3.3 Water Framework Directive (WFD) waterbodies close to the Proposed Development Site include the Tees Estuary, Tees Coastal, Tees Estuary (South Bank) (fluvial) waterbodies and the Sherwood Sandstone, Tees Mercia Mudstone and Redcar Mudstone groundwater bodies.
- 6.3.4 Each of the surface waterbodies is classified as being of Moderate ecological status (Environment Agency, 2019), with a fail in chemical status due to elevated levels of various priority substances. Tees Mercia Mudstone and Redcar Mudstone groundwater body had an overall classification of 'Poor' in 2019, due to a poor chemical-dependent surface waterbody status.
- 6.3.5 North-east of the Proposed Development Site, Coatham Sands is a designated bathing water (as 'Redcar Coatham'). The Environment Agency's Bathing Water Quality website notes that the Redcar Coatham bathing water is subject to short term pollution caused when heavy rainfall or high tides wash faecal material to the sea from livestock, sewage and urban drainage via rivers and streams. The southern

extent of the Seaton Carew North Gare Bathing Water is within 2 km of the Proposed Development Site and has a classification of Excellent for 2019.

- 6.3.6 In addition to the Tees Coastal waterbody and the Tees Transitional waterbody, the Proposed Development interacts with seven watercourses within the Tees Lower and Estuary Operational WFD Catchment, the baseline information on each water feature is provided in Table 6-1. Within Coatham Sands there is also a small, isolated, artificial pond. Water Constraints with 5 km of the Proposed Development Site are illustrated on Figure 11 (Appendix A). More detailed figures will be presented to illustrate all relevant water receptors at the PEI and ES stages.

Table 6-1: Water Features Which Interact with the Proposed Development

WATER FEATURE	BASELINE DESCRIPTION
Tees Coastal Water (GB650301500005)	The Tees Coastal water body stretches from approximately 20 km south-east of Redcar at Boulby, to approximately 13 km north-west of Redcar at Crimdon. It includes a total area of 88.31km ² . The Tees Coastal Water WFD waterbody is of 'Moderate' ecological potential, it's chemical status is 'Fail', and it's hydromorphological designation is 'heavily modified'.
Tees Transitional Water Body/ Seaton on Tees Channel Delta (GB510302509900)	The Tees Transitional water body extends from the Tees Barrage to the east of Stockton-on-Tees, to Teesmouth for a distance of approximately 16 km. It includes a total area of 11.44 km ² . The designation includes the mud and sand flats at Seal Sands, Tees Dock, Greatham Creek and Dabholm Gut. Greatham Creek is the estuarine section of Greatham Beck, which flows from the north of Elwick (National Grid Reference (NGR) NZ 45077 33468) to Seal Sands (NGR NZ 51667 25568) and into the Seaton on Tees Channel. The Tees Transitional WFD Waterbody is of 'Moderate' ecological potential, it's chemical status is 'Fail', and it's hydromorphological designation is 'heavily modified'.
Greatham Creek	The watercourse displays minimal historic change in planform since the early 1900s however the presence of meanders demonstrate some lateral movement historically. The Creek is formed in tidal flat deposits of sand, silt, and clay but some outer edges of meanders are encroaching upon till deposits. The upstream sections are constrained between arable land and a waste-management site with extensive management indicated by the presence of a floodplain embankment which disconnects Greatham Creek from much of the floodplain.
The Fleet/ Tees Estuary (South Bank) (GB1030250723320)	This watercourse is known on local mapping as The Fleet and is designated from adjacent to Longbeck Lane in Saltburn (NGR NZ 60988 20908). It continues north to the west of Redcar, and then flows west through the industrial works to discharge into Dabholm Gut at NGR NZ 56131 24038. The Tees Estuary (S Bank) WFD waterbody is of 'Moderate' ecological potential, it's chemical status is 'Fail', and it's hydromorphological designation is 'heavily modified'.
The Mill Race	The course of the Mill Race is unclear as it is largely culverted but appears to emanate from a coalescence of ditches and

WATER FEATURE	BASELINE DESCRIPTION
	watercourses at NGR NZ 57893 22824, then flows north of the Wilton International Site beneath the A1085. It reemerges at NGR NZ 57102 24152 and flows west into The Fleet. In this section the watercourse appears to be approximately 4 m wide flowing to a culvert, with artificial concrete banks in places. Banks are step and incised. There are numerous service crossings of the watercourse at this location.
Dabholm Beck/ Gut	The Dabholm Gut is an artificial channel of around 1 km length left following historical land reclamation. Upstream is Dabholm Beck which is formed from the coalescence of numerous small watercourses and drains through an area of freshwater marshland to the north-west of the Wilton International Site (upstream of the tidal limit). At the tidal limit where it becomes Dabholm Gut, the channel widens to approximately 30 m and numerous outfalls are present. The channel width remains constant up to the confluence with the Tees. Northumbrian Water's Bran Sands WwTW discharges into the Dabholm Gut.
Mains Dike	Mains Dike watercourse rises from a spring in Wilton Wood at NGR NZ 59328 19741. The watercourse then flows north along the eastern boundary of the Wilton International Site, and into the Mill Race at NGR NZ 57893 22824. Main's Dike is characterised by being very straight, around 1 m in width and with steep incised banks rising around 4 m from the channel. There is evidence of some lateral erosion of the banks and the formation of small, alternating fine gravel lateral bars.
Kettle Beck	Kettle Beck rises at Lazenby Bank and flows approximately 4 km generally north along the edge of the Wilton International Site, beneath the A1085, beneath the Teesside Works (Lackenby), and beyond the A1053 before discharging to the Tees. The exact course of the watercourse is no clear from online mapping north of the A1085 as the watercourse is culverted.
Kinkerdale Beck	This watercourse is mapped as a surface waterbody for 320 m at the north-western extent of the Wilton International Site (NZ 56071 20996) and is then in culvert. As such, the source and exact course of the watercourse is not known, although it is known to outfall to the Lackenby Channel.
Knitting Wife Beck	This watercourse rises just north of the A66 in Grangetown (NZ 55172 20910), before flowing north for approximately 300 m towards the Lackenby Steelworks. The watercourse is then culverted and so the course alignment is unclear but is known to outfall at the Lackenby Channel.
Lackenby Channel	The Lackenby Channel is a drainage cut between the Lackenby steelworks (NZ 55305 22207) and the eastern bank of the Tees estuary (NZ 54145 23341). It is approximately 1.6 km in length and conveys flows from Knitting Wife Beck, Kinkerdale Beck and Kettle Beck to the Tees.
Belasis Beck	Belasis Beck appears to rise from ponds in Belasis Hall Technology Park (NZ 47373 23267) and flows east for 2 km

WATER FEATURE	BASELINE DESCRIPTION
	before its confluence with Holme Fleet within Saltholme Nature Reserve at NZ 49071 23577
Network of drains	A number of smaller watercourses/drains are present within the study area, and whilst they do not have individual WFD classifications, if they interact with the Proposed Development Site, they will be considered at further phases of the assessment through the WFD water body catchment that they fall within. Watercourses that do not have individual WFD classifications take the classification of the receiving water body. The watercourses are likely to be largely artificial in nature and would have been developed, or modified, to aid land drainage. As a result, they are likely to be relatively low energy and uniform in nature, with little floodplain connectivity. However, individually they may contribute to the provision of aquatic habitat within the area, even if it is not the unaltered habitat of the area and therefore may still need to be considered.

Water Resources

- 6.3.7 The location of surface water, and groundwater abstractions, details of pollution incidents, and discharge consents will be requested from the Environment Agency to inform the assessment. Details of Private Water Supply (PWS) abstractions will be requested from the local authorities (i.e. RCBC, STBC and HBC) to inform the baseline.
- 6.3.8 A small section of the Proposed Development Site at Haverton Hill Road (within the Hydrogen Pipeline Corridor, at its western end) is located within a NVZ. There are no Drinking Water Protected Areas or Drinking Water Safeguard Zones (Groundwater or Surface Water) located within 15 km of the Proposed Development Site. The closest SPZ is located approximately 3.7 km north-west of the Proposed Development Site.
- 6.3.9 The Teesmouth and Cleveland Coast SPA is a catchment where future development must be nutrient neutral.

Designated Nature Conservations Sites

- 6.3.10 There are a number of statutory designated sites for nature conservation within the study area. Section 6.6: Ecology and Nature Conversation provides a list of SPAs, SACs, Ramsar Sites and NNRs within 15 km of the Proposed Development Site, and SSSIs and LNRs within 5 km of the Proposed Development Site. The following sites could potentially be impacted by the Proposed Development, due to their proximity to and hydrological relationship with the Proposed Development Site:
- Seaton Dunes and Common SSSI and LNR;
 - Charlton's Pond LNR;
 - Cowpen Bewley Woodland Country Park LNR;
 - Teesmouth NNR; and

- Teessmouth and Cleveland Coast SPA, Ramsar site and SSSI.

Flood Risk

- 6.3.11 Figure 11: Water Constraints with 5 km of the Proposed Development Site Boundary (Appendix A) illustrate the location of flood zones, main rivers, ordinary watercourse, and areas at risk of flooding from surface water as outlined below.
- 6.3.12 The River Tees (Main River) is located approximately 1 km west of the Main Site A and 75 m west of the Main Site B. The North Sea is located approximately 0.8 km to the north of the Main Site A and 1.1 km north of Main Site B. The Environment Agency (2022a) Flood Map for Planning' indicates that both Main Site A and Main Site B are located within Flood Zone 1, defined as, "*land having a less than 0.1% AEP of river or sea flooding.*"
- 6.3.13 The utility connection corridors (depending on the route option selected) may cross the following watercourses (some, at multiple locations):
- River Tees (Main River);
 - Greatham Creek (Main River);
 - Seaton on Tees Channel delta/Teessmouth NNR;
 - The Fleet (Ordinary Watercourse);
 - The Mill Race (Ordinary Watercourse);
 - Dabholm Beck/Gut (Ordinary Watercourse);
 - Mains Dike (Ordinary Watercourse);
 - Kettle Beck (Ordinary Watercourse);
 - Kinkerdale Beck (Ordinary Watercourse);
 - Belasis Beck; and
 - A complex network of drains, ditches, and tributaries flowing into the larger watercourses associated with the tidal nature of this location.
- 6.3.14 The main risk of flooding to the Proposed Development Site is tidal/fluviat, associated with the North Sea and watercourses in and around the Proposed Development Site. The River Tees is tidal at this location, with the normal tidal limit approximately 14 km upstream (at the Tees Barrage). Significant parts of the River Tees floodplain are within Flood Zone 2 (between 0.1% and 1% AEP river flooding and between 0.1% and 0.5% AEP sea flooding) and Flood Zone 3 (greater than 1% AEP river flooding and greater than 0.5% AEP sea flooding). Some areas to the north of the Greatham Creek and in the Seal Sands and Haverton Hill area are shown to be benefitting from flood defences.
- 6.3.15 Whilst Main Site A, Main Site B, the CO₂ Export Corridors and the Natural Gas Connections Corridor are located entirely in Flood Zone 1, a significant amount of the Hydrogen Pipeline Corridor is located within Flood Zones 2 and 3, as illustrated on Figure 11: Water Constraints within 5 km of the Proposed Development Site

Boundary (Appendix A). Small areas of the Electrical Connection Corridor and the Water Connections Corridor are also located within Flood Zones 2 and 3. Early discussions with the EA as well as interrogation of EA mapping illustrate that some of the current pipeline corridors interface with EA flood defences near Greatham Creek. This will be a consideration as the design and routing of the hydrogen pipelines progress to ensure the integrity of these defences is not affected.

- 6.3.16 The Environment Agency Long Term Flood Risk map (Environment Agency 2022b), which includes Flood Risk from Surface Water (FRfSW), shows that the Main Site and Main Site B are generally at very low risk (less than 0.1% AEP). There are isolated pockets of low risk (between 0.1% and 1% AEP) throughout both Main Sites which appear to be associated with topographic low points. There are no pluvial flood flow routes crossing the Main Site A or Main Site B as per Environment Agency mapping. Environment Agency mapping shows surface water flow routes and areas of ponding associated with watercourses and bodies of water across the utility connection corridors.
- 6.3.17 Environment Agency mapping shows that a significant portion of the area is at risk of flooding in the unlikely event of a breach or failure of reservoirs. The reservoir flood extents largely follow the fluvial/tidal floodplains in the area. Both Main Site A and Main Site B are shown not to be affected, but the proposed pipeline corridors would cross the reservoir flood extents. Environment Agency mapping shows that the risk is associated with several reservoirs including: Hury Subsidiary, Balderhead, Blackton, Cow Green, Crookfoot, Grassholme, Selset. These are owned by Northumbrian Water with the exception of Crookfoot which is privately owned.
- 6.3.18 The Canal and River Trust online mapping (Canal and River Trust, 2022) does not identify any canals within the vicinity of the Proposed Development Site.
- 6.3.19 There are no substantive differences in the baseline conditions between Main Site A and Main Site B, therefore the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

- 6.3.20 The following potential impacts may be associated with the Proposed Development during construction (and decommissioning) and operation phases:
- Potential impacts to water conveyance where proposed pipelines cross watercourses during construction (above and below ground pipelines) and operation (for above ground pipelines).
 - Encroachment within Flood Zones 2 and 3 (including potentially the functional floodplain) could lead to the displacement of fluvial/tidal floodwater during construction and operation (above ground); subject to the preferred route of the pipeline corridors.
 - Potential impact on Environment Agency flood defences where the proposed pipeline crosses/affects these areas. The impact on the defences (during

construction and operation) would need to be appropriately assessed to demonstrate that they would not be compromised by the proposals.

- Potential changes to existing surface water (pluvial) flows during construction phase (for above and below ground pipelines) and operation phase (for above ground pipelines); subject to the preferred route of the pipeline corridors.
 - Potential impacts on groundwater flows during construction and operation phase (for below ground pipelines). There will be no direct discharges to groundwater. However, the potential for contaminant mobilisation from the Proposed Development and the resultant impacts to groundwater will be considered with the Geology and Hydrogeology assessments.
 - Potential impacts of future flooding from all sources to and from the Proposed Development, including (but not limited to) a potential risk to construction workers during the construction phase, due to risk of fluvial/tidal and reservoir flooding.
 - Pollution of surface watercourses within or near the Proposed Development Site (including associated development) during construction and decommissioning, due to chemical spillages, contaminant mobilisation or surface water run-off containing elevated concentrations of fine sediment.
 - Water quality impacts to surface water features that may receive surface water runoff, cooling water or treated effluent discharges from the Proposed Development (e.g. DMW Plant, ETP and operation of the Flare). At this stage, information on effluent streams is limited and where discharges are likely to be proposed is under review. On-site treatment or return of effluent to Bran Sands WwTW are options. The use of amine will require specific waste management procedures. Options for discharge will be evaluated as part of the assessment process, including consideration of nutrient neutrality.
 - Water quality impacts on receiving watercourses from an increase in foul drainage from the Proposed Development. At this stage it is assumed foul flows will be to either Bran Sands or Marske-on Sea WwTW where it will be treated in accordance with the prevailing regulatory requirements. Loads are expected to be small in comparison to the populations served by both works. Nevertheless, the assessment will qualitatively consider any change in risk from these emissions. Foul drainage from employment sites that do not increase overnight stays are exempt from any nutrient neutrality assessment requirements in respect of the Teesmouth and Cleveland Coast SPA.
- 6.3.21 The Production Facility will require a supply of water for operation. The source of this water is yet to be determined but may include reclaimed water from Bran Sands WwTW or a supply of water from Northumbrian Water (which is expected to be raw water from the River Tees).
- 6.3.22 In both cases for water provision to the Proposed Development (i.e. use of reclaimed or raw water), the water would otherwise be present in or discharged to the River Tees. Thus, where the quality of this water remains fundamentally unchanged by its

- use by the Production Facility, it should be possible to discharge this water back to the River Tees whilst also maintaining the appropriate levels regarding nutrient loads. If the quality of the water is altered or it is discharged to another water feature further assessment will be undertaken, including assessment of nutrient neutrality if necessary.
- 6.3.23 An impact assessment will be undertaken to assess the potential effects on the water environment including a desk study to review relevant legislation, policy and guidance. The assessment will be primarily qualitative and based on a source-pathway-receptor approach. The significance of effects will be determined using best practice guidance, where the importance of the receptor is determined separately from the magnitude of impact. Where required the assessment will include recommendations for mitigation measures.
- 6.3.24 Hydromorphological site visits are proposed to scope potential watercourses affected, inform if watercourse crossings/alterations to existing structures are likely to need to be designed, and inform potential opportunities for mitigation or enhancement.
- 6.3.25 Various construction methodologies are being considered which include more intrusive approaches like open trench.
- 6.3.26 Although unlikely it is currently unknown at this stage whether there will be any new engineered surface water outfalls to watercourses, which can also lead to localised adverse impacts. Overall, a qualitative impact assessment shall be undertaken to determine the effect to the hydromorphology of watercourses.
- 6.3.27 As outlined above, at this stage, information on effluent streams and where discharges are likely to be proposed is still being evaluated. Whatever approach is progressed, the use of amine will require specific waste management procedures. The scope of assessment for these issues will be refined in consultation with relevant statutory consultees. The need for any field data collection will be determined, as well as whether further risk assessment or water quality modelling is needed.
- 6.3.28 A semi-quantitative surface water quality risk assessment will be undertaken for above ground infrastructure using the SuDS Manual Simple Index Approach (Construction Industry Research and Information Association (CIRIA) C753, 2016) to ensure that the surface water drainage system provides adequate treatment of runoff. This will not apply to areas of the Proposed Development Site where hazardous chemicals will be stored and used, with the risk from these locations assess qualitatively with reference to propose spillage and containment measures and emergency incident response plans.
- 6.3.29 Within Coatham Sands is a single open water pond that lies close to the former Redcar Steel works in an area of dunes that has formed across former slag heaps. Water quality of the pond was previously monitored by AECOM in 2020-2021 as part of baseline studies for the nearby NZT Project. It is proposed to gather 3 No. additional monthly water quality samples from the pond with the water tested at a suitable laboratory for a range of physico-chemical and nutrient parameters. If there

is concern that the Proposed Development may result in an increase in nitrogen deposition on the pond, this baseline data will be used to carry out simple mass balance analysis to assess the risk of nutrient enrichment, and to provide advice on surface water runoff treatment and containment requirements if required.

Flood Risk Assessment and Drainage

- 6.3.30 In accordance with NPS EN-1 (DECC, 2011a) and the NPPF (Ministry of Housing, Communities and Local Government (MHCLG), 2021), applications for energy projects of 1ha or greater in Flood Zone 1 are to be accompanied by a FRA. An FRA will be prepared and will consider risks to the Proposed Development from flooding as well as the potential for the construction and operation to increase flood risk off-site. The Environment Agency and relevant Lead Local Flood Authorities (LLFAs) will be consulted for local water and flood data to inform the assessments and to confirm the assessment approach, in particular around the treatment of existing Environment Agency defences where these interface with the Proposed Development (e.g. western extents of Hydrogen Pipeline Corridor around Greatham). The assessment of flood risk will also take into account the most recent climate change allowances.
- 6.3.31 A surface water drainage strategy for the Main Site will be prepared to demonstrate the surface water runoff arising from the Proposed Development is managed sustainably and does not increase flood risk off-site.

Water Framework Directive Assessment

- 6.3.32 Due to the potential for adverse impacts on WFD designated water bodies as described above, a WFD assessment will be required. The assessment will be undertaken in accordance with the approach set out in PINS Advice Note 18: The Water Framework Directive (2017).
- 6.3.33 It is initially proposed that a Screening and Scoping WFD Assessment will be undertaken to define the components of the Proposed Development that are relevant, consider the impact pathways, assess the likely significance of any adverse impacts, and determine what the scope for mitigation might be. It is proposed to 'extend' this screening and scoping assessment to include a qualitative assessment of the Proposed Development to consider the potential for any non-compliance of the Proposed Development with WFD objectives for affected waterbodies, using readily available information and site observations.
- 6.3.34 Depending on the outcomes of the preliminary assessment, more detailed investigations may be required, which will be determined in consultation with the Environment Agency. The WFD Screening and Scoping Assessment will be prepared at the PEI stage and the Environment Agency consulted on the outcome.

Nutrient Neutrality Assessment

- 6.3.35 Natural England have identified the Teesmouth and Cleveland Coast SPA as a site that is impacted by excess nutrients. In particular, the Seal Sands area is known to be adversely impacted; excessive growth of algal mats are impacting feeding opportunities for the bird populations that the SPA is designated for. Any

development in the catchment of the SPA that may lead to an increase in the nitrogen emissions must be supported by a robust nutrient neutrality assessment.

- 6.3.36 At this stage there remains uncertainty as to whether the Proposed Development will generate an increase in nitrogen in the Teesmouth and Cleveland Coast SPA catchment. Therefore, it is initially proposed to carry out a Nutrient Neutrality Screening Assessment at the PEI stage. This screening assessment will determine the need or otherwise for a full nutrient neutrality assessment for the Proposed Development. It will identify all possible sources of nitrogen from the Proposed Development (including atmospheric deposition, changes in discharges from local WwTW and direct treated effluent discharges) and consider (1) whether this is a new source or fundamentally already part of the catchments nutrient baseline; and (2) whether there is a pathway to the SPA. Where there is scope to reduce nutrient emissions compared to baseline from the site, these will also be considered. Natural England will be consulted on the outcome of the assessment during which the scope of further assessment will be agreed.
- 6.3.37 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.4 Geology, Hydrogeology and Contaminated Land

Baseline Conditions

Main Site A

- 6.4.1 The western part of the northern half of Main Site A (the 'Foundry North') and the entirety of the southern half of Main Site A (the 'Foundry South') are understood to have been previously reclaimed land from the River Tees.
- 6.4.2 Recent studies undertaken by bp indicate that the following geological sequence underlies the Foundry North:
- variable depth of Made Ground to 10 m below ground level (bgl), typically to 2.0 m to 6.0 m where base was proven;
 - Tidal Flat Deposits;
 - Glacial Till; and
 - Mudstone bedrock (comprising Mercia Mudstone Group, Penarth Formation and Redcar Mudstone) from 13.50 m to 15.15 m bgl.
- 6.4.3 The following geological sequence underlies the Foundry South:
- variable depth of Made Ground to 7 m bgl, typically to 2.0 m to 6.0 m where base was proven;
 - Tidal Flat Deposits to a maximum depth of 18.0 m bgl;
 - Glacial Till identified between 12.1 m to 17.3 m bgl where encountered; and
 - Mudstone bedrock (comprising Mercia Mudstone Group, Penarth Formation and Redcar Mudstone).

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- 6.4.4 The Superficial Tidal Flat Deposits underlying Main Site A are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt whilst Glacial Till is designated as a Secondary (Undifferentiated) Aquifer. Whilst not identified in the ground investigation, Glacio-lacustrine deposits may be present. These designated as Unproductive Strata when clay or a Secondary A aquifer when silt, Redcar Mudstone Formation is designated as Secondary (Undifferentiated) aquifer, the Penarth Formation is designated as a Secondary (Undifferentiated)/Secondary B aquifer and the Mercia Mudstone bedrock is designated as Secondary B aquifer.
- 6.4.5 There are no SPZs, Drinking Water Protected Areas, Drinking Water Safeguard Zones (Surface Water and Groundwater) or groundwater, potable water or surface water abstraction licences within 1 km of Main Site A.
- 6.4.6 Groundwater is present within the Made Ground, superficial deposits and bedrock underlying Main Site A. The groundwater in the Made Ground and superficial deposits is assumed to be in hydraulic continuity. There is potential for hydraulic connection between the superficial deposits and bedrock.
- 6.4.7 Records indicate that within the Foundry North part of Main Site A, groundwater is present between 2.37 m AOD and 3.62 m AOD with an apparent flow towards the west to north-west. Within the Foundry South part of Main Site A, records indicate that groundwater is present between 2.29 m AOD and 5.48 m AOD, with an apparent flow towards the north-west.
- 6.4.8 The following are potential sources of contamination at the Foundry North part of Main Site A:
- former steelworks: blast furnace, coke ovens, gas holders, by-products plant, coke stock, effluent plant and various storage plants;
 - Made Ground including slag and clinker with visual/olfactory evidence of contamination including hydrocarbon and NH₃ odours;
 - localised exceedances of industrial/commercial Generic Assessment Criteria (GAC) for cyanide and selected Polycyclic Aromatic Hydrocarbons (PAHs) in Made Ground and Tidal Flat deposits;
 - localised asbestos fibres in Made Ground; and
 - exceedances of water quality criteria in soil leachate and groundwater in Made Ground and Tidal Flats.
- 6.4.9 The following are potential sources of contamination at the Foundry South part of Main Site A:
- former steel works including blended ore stocks and coke crushing plant;
 - Made Ground with visual/ olfactory evidence of contamination including hydrocarbon and NH₃ odours, orange / iron staining, white mineralisation/ sulphur mineralisation on slag, localised tar cobbles, sulphur odours;
 - localised asbestos fibres in Made Ground; and
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- localised exceedances of industrial/commercial GAC for cyanide and selected PAHs in Made Ground and Tidal Flat deposits.
- 6.4.10 The following potential sources of off-site contamination are present within the vicinity of Main Site A:
- Bran Sands licensed landfill;
 - Bran Sands WwTW;
 - Warrenby 3A / CLE31 landfill on Teesworks Long Acres site;
 - electrical substations;
 - Sahaviriya Steel Industries (SSI) Steelworks (including blast furnace, sinter plant, power station, crushing and blending plant and former pellet plant);
 - former Redcar and Coatham iron works;
 - known Heavy Fuel Oil spill adjacent to south-east corner of the Main Site; and
 - railway lines and sidings.
- 6.4.11 The ground beneath Main Site A has been identified in the STDC Regeneration Master Plan (RMP) (STDC, 2019) in an assessment of ground hazards. It is currently likely to contain a number of potential contaminants from former historic use, potentially including heavy metals, asbestos, sulphates and hydrocarbons. The potential contaminants may be associated with a former coke works and by-products and a former iron making site (Redcar Blast Furnace) identified on the STDC RMP potential major hazards map.
- CO₂ Export Corridors (Main Site A)**
- 6.4.12 Publicly available British Geological Survey (BGS) borehole records and geological maps (BGS, 2022) indicate that the CO₂ Export Corridors are underlain by the following sequence of strata:
- Made Ground;
 - Tidal Flat Deposits (Superficial Deposits); and
 - Redcar Mudstone Formation (Bedrock).
- 6.4.13 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the entire area of the CO₂ Export Corridors. These deposits are likely to be associated with the land that has been reclaimed from the River Tees.
- 6.4.14 The CO₂ Export Corridors are located immediately adjacent to the Main Site. Therefore, historical GI data for the areas adjacent to the CO₂ Export Corridors is summarised in the section for Main Site A.
- 6.4.15 The Superficial Tidal Flat Deposits underlying the CO₂ Export Corridors are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt. If present, the Glacio-lacustrine deposits are designated as Unproductive Strata when clay or a Secondary A aquifer when silt, whilst Glacial Till
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is designated as a Secondary (Undifferentiated) Aquifer. The Mercia Mudstone bedrock is designated as Secondary B aquifer, the Penarth Formation is designated as a Secondary (Undifferentiated)/Secondary B aquifer and the Redcar Mudstone is designated as a Secondary (Undifferentiated) aquifer.

- 6.4.16 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the CO₂ Export Corridors, nor are there any groundwater, potable water or surface water abstraction licences located within 1 km of it.
- 6.4.17 The potential sources of off-site contamination present within the vicinity of the CO₂ Export Corridors, and the nearby authorised and historical landfills, are the same as those listed in relation to the Main Site A.
- 6.4.18 The ground to the north of the CO₂ Export Corridors has been identified in the STDC RMP in an assessment of ground hazards. It is likely to contain a number of potential contaminants from former historic use, such as heavy metals, asbestos, sulphates and hydrocarbons. The potential contaminants may be associated with a former coke works and by-products, former iron and steel works and a former steel making site (Redcar Blast Furnace) located to the north, as identified on the STDC RMP major ground hazards map.

Hydrogen Pipeline Corridor (Main Site A)

- 6.4.19 Publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Hydrogen Pipeline Corridor is underlain by the following sequence of strata:
- Made Ground;
 - Superficial deposits:
 - Tidal Flat Deposits;
 - Alluvium (Clay, Silt, Sand and Gravel);
 - Blown Sand;
 - Devensian Glaciolacustrine Deposits (Clay and Silt); and
 - Devensian Glacial Till (Boulder Clay).
 - Sherwood Sandstone Group (in the western part of the Hydrogen Pipeline Corridor); and
 - Mudstone bedrock (comprising Mercia Mudstone Group, Penarth Formation and Redcar Mudstone), in the eastern part of the Hydrogen Pipeline Corridor.
- 6.4.20 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the centre and most of the eastern area of the Hydrogen Pipeline Corridor. These deposits are likely to be associated with the land that has been reclaimed from the River Tees.

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- 6.4.21 Historical GI data from Wardell Armstrong (2016) relating to the Seal Sands area located adjacent to the Hydrogen Pipeline Corridor indicates that the Made Ground present could be up to 5 m thick and be associated with fill material from the land reclamation.
- 6.4.22 The area within Seal Sands was used for historical landfilling for construction, non-hazardous industrial materials, slag and inert waste. A GI Factual Report from RSK (2007) noted that Made Ground is present to 3.7 m bgl with hydrocarbon and organic odours noted. Tidal Flat Deposits were encountered between 0.1 m bgl and 27 m bgl, and were approximately 15 m thick. The deposits comprised silt, sand and clay, and were found to be underlain by stiff boulder clay (Glacial Till), approximately 10 m thick. Bedrock was encountered between 25.5 m bgl and 28.5 m bgl. Monitoring undertaken by ConocoPhillips (RSK, 2007) indicated that groundwater was encountered between 0.8 m bgl and 1 m bgl.
- 6.4.23 The Superficial Tidal Flat Deposits underlying the Hydrogen Pipeline Corridor are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt. The Devensian Glacial Till Deposits are designated as a Secondary (Undifferentiated) Aquifer. The Alluvial Deposits and the Blown Sand Deposits are designated as a Secondary A Aquifer. The Glaciolacustrine Deposits (clay and silt) underlying the Hydrogen Pipeline Corridor are designated as Unproductive Strata where clay and a Secondary A aquifer where silty.
- 6.4.24 The Sherwood Sandstone Group is designated as a Principal Aquifer. Mercia Mudstone Group is designated as a Secondary B Aquifer. The Penarth Formation is designated as a Secondary (Undifferentiated)/Secondary B aquifer. The Redcar Mudstone Formation is designated as a Secondary Undifferentiated Aquifer.
- 6.4.25 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Hydrogen Pipeline Corridor.
- 6.4.26 The Groundsure (2022) Enviro Data Viewer indicates that a number of historic and authorised landfills are located within approximately 300 m of the Hydrogen Pipeline Corridor:
- Cowpen Bewley Landfill Site;
 - West of Wolviston to Seal Sands Link Road Historic Landfill Site;
 - Seal Sands Historic Landfill Site;
 - South of Seal Sands Historic Landfill Site;
 - Bran Sands Landfill Site;
 - Warrenby 3A / CLE31 landfill on Teesworks Long Acres site;
 - Wilton Perimeter Mounds Landfill Site;
 - Redcar Trunk Road Historic Landfill Site;
 - ICI No. 2 Teesport Historic Landfill Site;
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- ICI No. 3 Teesport Landfill Site;
 - CLE 3/8 Landfill Site;
 - Fire Bund Port Clarence Historic Landfill;
 - Port Clarence Non-Hazardous Landfill Site; and
 - Disused Railway Cutting Historic Landfill Site.
- 6.4.27 However, it should be noted that the extent of the Hydrogen Corridor is anticipated to be refined. Therefore, the number of landfills in its proximity may change.
- 6.4.28 The ground immediately adjacent to the Hydrogen Pipeline Corridor has been identified in the STDC RMP in an assessment of ground hazards. It is likely to contain a number of potential contaminants from current land use, such as heavy metals, asbestos, sulphates, hydrocarbons and inorganic and organic compounds. The potential contaminants are associated with a hazardous waste landfill and an iron and steel making by-products landfill (former SSI high tip) identified on the STDC RMP major ground hazards map.
- Natural Gas Connection Corridor (Main Site A)**
- 6.4.29 Publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Natural Gas Connection Corridor is underlain by the following sequence of strata:
- Made Ground;
 - Blown Sand (may be present underlying the eastern boundary of the Natural Gas Connection Corridor) (Superficial);
 - Tidal Flat Deposits (Superficial);
 - Glacial Till/Glacio-lacustrine deposits; and
 - Redcar Mudstone Formation (Bedrock).
- 6.4.30 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the entire area of the Natural Gas Connection Corridor. These deposits are likely to be associated with the land that has been reclaimed from the River Tees.
- 6.4.31 The Natural Gas Corridor is located immediately adjacent to Main Site A. Therefore, historical GI data for the areas adjacent to the Natural Gas Corridor are summarised in the section relating to Main Site A.
- 6.4.32 The Superficial Tidal Flat Deposits underlying the Natural Gas Connection Corridor are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt, the Glacio-lacustrine deposits are designated as Unproductive Strata when clay or a Secondary A aquifer when silt, whilst Glacial Till is designated as a Secondary (Undifferentiated) Aquifer. The Mercia Mudstone bedrock is designated as Secondary B aquifer.
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- 6.4.33 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Natural Gas Connection Corridor.
- 6.4.34 The Groundsure (2022) Enviro Data Viewer indicates that one landfill is located within 0.3 km of the Natural Gas Corridor. The Bran Sands authorised landfill, which accepts special waste, is located approximately 270 m south of the Natural Gas Corridor.
- 6.4.35 The ground immediately adjacent to the Natural Gas Connection Corridor has been identified in the STDC RMP in an assessment of ground hazards. It is likely to contain a number of potential contaminants from former historic use, such as heavy metals, asbestos, sulphates and hydrocarbons. The potential contaminants are associated with a former iron and steel works which falls within the Natural Gas Connection Corridor as identified on the STDC RMP major ground hazards map.

Electrical Connection Corridor (Main Site A)

- 6.4.36 Publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Electrical Connection Corridor is underlain by the following sequence of strata:
- Made Ground;
 - Superficial Deposits:
 - Tidal Flat Deposits;
 - Blown Sand;
 - Devensian Glaciolacustrine Deposits (Clay and Silt); and
 - Devensian Glacial Till.
 - Mudstones from the Mercia Mudstone Group, Penarth Formation and the Redcar Mudstone Formation.
- 6.4.37 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the western half of the Electrical Connection Corridor. These deposits are likely to be associated with the land that has been reclaimed from the River Tees.
- 6.4.38 Historical BGS boreholes located to the south of the Electrical Connection Corridor identified Made Ground in one borehole to a depth of 5 m bgl. Glaciolacustrine Deposits and Devensian Clay were identified between 0.2 m bgl and 13 m bgl with approximate thickness of 11 m. The Redcar Mudstone was encountered at 11.2 m bgl and was described as a highly weathered grey mudstone. Groundwater was encountered further south between 2 m and 3 m bgl within soft silty clay.
- 6.4.39 Historical BGS boreholes and trial pit data from a recent bp study indicates that Made Ground is present to the immediate east of the Electrical Connection Corridor, within the existing British Steel Lackenby site. The Made Ground may be present to 5.8 m bgl and is comprised of slag, brick, waste demolition and cohesive fill. The superficial
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deposits are comprised of soft to firm brown silty clay (Glaciolacustrine Deposits) and stiff brown boulder clay (Glacial Till) to 10.7 m bgl. Stiff weathered mudstone and shale were encountered in historical boreholes. Groundwater was encountered between 0.7 m bgl and 3.4 m bgl at the interface of Made Ground and natural cohesive deposits in 38 out of 75 trial pits.

- 6.4.40 Further GI data for the area immediately to the north of the Electrical Connection Corridor is summarised in the previous section which relates to Main Site A.
- 6.4.41 The Blown Sand Deposits underlying the Electrical Connection Corridor are designated as a Secondary A aquifer. The Superficial Tidal Flat Deposits are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt, the Glacio-lacustrine deposits are designated as Unproductive Strata when clay or a Secondary A aquifer when silt, whilst Glacial Till is designated as a Secondary (Undifferentiated) Aquifer. The Mercia Mudstone Group is designated as a Secondary B Aquifer. The Penarth Formation is designated as a Secondary (Undifferentiated)/Secondary B aquifer and the Redcar Mudstone Formation is designated as a Secondary Undifferentiated Aquifer.
- 6.4.42 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Electrical Connections Corridor.
- 6.4.43 The Groundsure (2022) Enviro Data Viewer indicates that a number of historic and authorised landfills are located within 0.3 km of the Electrical Connection Corridor.
- 6.4.44 The following are wholly or partially located within the Electrical Connection Corridor:
- The Redcar Trunk Road Landscaping historic landfill site (last input date is recorded as 10th August 1979);
 - The Wilton Perimeter Mounds Industrial Waste Landfill (factory curtilage) authorised site;
 - Mushroom Grove Allotments historic landfill site (last input date recorded as 2nd April 1985); and
 - Teesdock Road historic landfill site (last input date of 31st March 1983).
- 6.4.45 In addition to the above, Bran Sands authorised landfill site, which accepted special waste, is adjacent to the western boundary of the Electrical Connection Corridor. Warrenby Landfill Site, which accepts household, commercial and industrial waste is located adjacent to the north-east boundary of the Electrical Connection Corridor. ICI No 2 Teesport (authorised landfill site) is located approximately 100 m west of the Electrical Connection Corridor.
- 6.4.46 The ground beneath the Electrical Connection Corridor has been identified in the STDC RMP in an assessment of ground hazards. It is likely to contain a number of potential contaminants from former historic use and current land use, such as heavy metals, asbestos, sulphates and hydrocarbons. The potential contaminants may be associated with a former iron and steel works, a current iron and steel making closed

landfill and iron and steel making waste recycling site identified on the STDC RMP major ground hazards map.

Water Connections Corridor (Main Site A)

- 6.4.47 Publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Water Connections Corridor is underlain by the following strata:
- Made Ground;
 - Tidal Flat Deposits (Superficial);
 - Glaciolacustrine Deposits (Superficial);
 - Glacial Till (Superficial);
 - Blown Sand (may be present underlying eastern boundary of the Water Connections Corridor) (Superficial); and
 - Redcar Mudstone Formation (Bedrock).
- 6.4.48 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the entire northern section of the Water Connections Corridor. These deposits are likely to be associated with the land that has been reclaimed from the River Tees. The rest of the Water Connections Corridor is not mapped as Made Ground but Made Ground is likely to be present, given current and historical development in the area.
- 6.4.49 The Water Connections Corridor is located immediately adjacent to Main Site A and extends approximately 1.5 km south-east of the corridor. Historical GI data for the areas adjacent to the Water Connections Corridor are summarised under the section relating to Main Site A.
- 6.4.50 The Blown Sand Deposits underlying the Water Connections Corridor are designated as a Secondary A aquifer. The Superficial Tidal Flat Deposits are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt, the Glacio-lacustrine deposits are designated as Unproductive Strata when clay or a Secondary A aquifer when silt. Glacial Till is designated as a Secondary (Undifferentiated) Aquifer. The Redcar Mudstone Formation is designated as a Secondary Undifferentiated Aquifer.
- 6.4.51 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Water Connections Corridor.
- 6.4.52 The Groundsure (2022) Enviro Data Viewer indicates that one active and one historical landfill are located within the Water Connections Corridor. Wilton, Perimeter Mounds is located in the central area of the Water Connections Corridor and accepts industrial waste. The historical landfill site located in the central area of the Water Connections Corridor relates to Redcar Trunk Road Landscaping (last input date recorded as August 1979). Two authorised landfills and one historic landfill are also located within 0.3 km of the Water Connections Corridor:

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- Bran Sands licensed landfill, which accepted special waste, is adjacent to the western boundary of the Water Connections Corridor;
 - Warrenby Landfill is located adjacent to the east of the Water Connections Corridor and accepts household, commercial and industrial waste; and
 - Teesport Eston Tip (historic landfill) is located approximately 300 m west of the Water Connections Corridor (last input date recorded as 17th September 1993).
- 6.4.53 The ground immediately adjacent to the Water Connections Corridor has been identified in the STDC RMP in an assessment of ground hazards. It is likely to contain a number of potential contaminants from former historic use potentially including heavy metals, asbestos, sulphates and hydrocarbons. The potential contaminants may be associated with a former iron and steel works which encroaches onto the boundary of the Water Connections Corridor as identified on the STDC RMP major ground hazards map.
- Other Gases Connection Corridor (Main Site A)**
- 6.4.54 Publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Other Gases Connection Corridor is underlain by the following strata:
- Made Ground;
 - Tidal Flat Deposits (Superficial);
 - Glacial Till;
 - Glacio-lacustrine deposits;
 - Blown Sand (may be present underlying small portion of the north-eastern bend of the Other Gases Connection Corridor) (Superficial);
 - Penarth Formation – Mudstone (Bedrock); and
 - Redcar Mudstone Formation (Bedrock).
- 6.4.55 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies nearly the entirety of the Other Gases Connection Corridor. These deposits are likely to be associated with the land that has been reclaimed from the River Tees. A small portion of the north-eastern bend in the corridor is not mapped as Made Ground but Made Ground is likely to be present, given current and historical development in the area.
- 6.4.56 The Other Gases Connection Corridor is located immediately adjacent to Main Site A and extends approximately 2 km to the south-east. Therefore, historical GI data for the areas adjacent to the Other Gases Connection Corridor are summarised under the section above relating to Main Site A.
- 6.4.57 The Blown Sand Deposits underlying the Other Gases Connection Corridor are designated as a Secondary A aquifer. The Superficial Tidal Flat Deposits are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt, Glacio-lacustrine deposits are designated as Unproductive Strata when clay or a Secondary A aquifer when silt, whilst Glacial Till
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is designated as a Secondary (Undifferentiated) Aquifer. The Penarth Formation is designated as a Secondary (Undifferentiated)/Secondary B aquifer. The Redcar Mudstone Formation is designated as a Secondary Undifferentiated Aquifer.

- 6.4.58 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Other Gases Connection Corridor.
- 6.4.59 The Groundsure (2022) Enviro Data Viewer indicates that there are no active or historical landfill are located within the Other Gases Connection Corridor. The following authorised and historical landfills are located within 0.3 km of the corridor:
- Bran Sands licensed landfill (now closed), which accepted special waste, is adjacent to the western boundary of the Other Gases Connection Corridor;
 - Teesport Eston Tip (historic landfill) is located approximately 0.3 km west of the Other Gases Connection Corridor (last input date recorded as 17th September 1993).
- 6.4.60 The ground adjacent to the Other Gases Connection Corridor has been identified in the STDC RMP in an assessment of ground hazards. It is likely to contain a number of potential contaminants from former historic use, such as heavy metals, asbestos, sulphates and hydrocarbons. The potential contaminants may be associated with a former iron and steel works to the north-east as identified on the STDC RMP major ground hazards map.
- Main Site B – RBT**
- 6.4.61 The geology, hydrogeology and contaminated land baseline data presented for the Main Site A is relevant for the Main Site B.
- 6.4.62 The following geological sequence underlies Main Site B:
- Made Ground;
 - Tidal Flat Deposits (Superficial);
 - Glaciolacustrine Deposits (Superficial);
 - Glacial Till (Superficial); and
 - Mercia Mudstone Formation (Bedrock).
- 6.4.63 The Superficial Tidal Flat Deposits underlying Main Site B are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt, the Glacio-lacustrine deposits are designated as Unproductive Strata when clay or a Secondary A aquifer when silt, whilst Glacial Till is designated as a Secondary (Undifferentiated) Aquifer. The Mercia Mudstone bedrock is designated as Secondary B aquifer.
- 6.4.64 Main Site B has been used as an bulk import terminal for coal and iron ore amongst other raw materials for the steel industry for over 40 years. In addition to current remaining stockpiles, washed-in fines and leachable contamination from stockpiled materials from may be present below ground. Main Site B is directly adjacent to the

Foundry (Main Site A), a site that has been identified in the STDC RMP as likely to contain a number of potential contaminants.

- 6.4.65 Potential sources of off-site contamination are considered to be the same as those identified for Main Site A.

CO₂ Export Corridor – RBT (Main Site B) Extension

- 6.4.66 The geology, hydrogeology and contaminated land baseline data detailed for CO₂ Export Corridor (Main Site A) is relevant to the CO₂ Export Corridor Extension associated with Main Site B.

- 6.4.67 The Superficial Tidal Flat Deposits underlying the CO₂ Export Corridor Extension are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt, the Glacio-lacustrine deposits are designated as Unproductive Strata when clay or a Secondary A aquifer when silt, whilst Glacial Till is designated as a Secondary (Undifferentiated) Aquifer. The Mercia Mudstone bedrock is designated as Secondary B aquifer, the Penarth Formation is designated as a Secondary (Undifferentiated)/Secondary B aquifer and the Redcar Mudstone is designated as a Secondary (Undifferentiated) aquifer.

Hydrogen Pipeline Corridor - RBT (Main Site B) Extension

- 6.4.68 The geology, hydrogeology and contaminated land baseline data detailed for the Hydrogen Pipeline Corridor (associated with Main Site A) is relevant for the Hydrogen Pipeline Corridor Extension associated with Main Site B, except that publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Hydrogen Pipeline Corridor Extension is underlain by the following sequence of strata:

- Made Ground;
- Tidal Flat Deposits (Superficial);
- Glacial Till/Glacio-lacustrine deposits;
- Mercia Mudstone Group;
- Penarth Formation; and
- Redcar Mudstone Formation.

- 6.4.69 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the Hydrogen Pipeline Corridor Extension. These deposits are likely to be associated with the land that has been reclaimed from the River Tees and subsequent development as RBT.

- 6.4.70 The Superficial Tidal Flat Deposits underlying the Hydrogen Pipeline Corridor Extension are designated as either a Secondary (Undifferentiated) aquifer when clay, or a Secondary A aquifer for sand and silt. The Devensian Glacial Till Deposits are designated as a Secondary (Undifferentiated) Aquifer. The Alluvial Deposits are designated as a Secondary A Aquifer. The Glaciolacustrine Deposits (clay and silt) underlying the corridor extension are designated as Unproductive Strata where clay and a Secondary A aquifer where silty.

6.4.71 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Hydrogen Pipeline Corridor extension.

Natural Gas Connection Corridor – RBT (Main Site B) Extension

6.4.72 The geology, hydrogeology and contaminated land baseline data detailed for the Natural Gas Connection Corridor (associated with Main Site A) is relevant for the Natural Gas Connection Corridor Extension associated with Main Site B, except that publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Natural Gas Connection Corridor Extension is underlain by the following sequence of strata:

- Made Ground;
- Tidal Flat Deposits (Superficial);
- Glacial Till/Glacio-lacustrine deposits;
- Mercia Mudstone Group;
- Penarth Formation; and
- Redcar Mudstone Formation.

6.4.73 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the Natural Gas Connection Corridor Extension. These deposits are likely to be associated with the land that has been reclaimed from the River Tees and subsequent development as RBT.

6.4.74 The Superficial Tidal Flat Deposits underlying the Natural Gas Connection Corridor Extension are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt. The Devensian Glacial Till Deposits are designated as a Secondary (Undifferentiated) Aquifer. The Alluvial Deposits are designated as a Secondary A Aquifer. The Glaciolacustrine Deposits (clay and silt) underlying the corridor extension are designated as Unproductive Strata where clay and a Secondary A aquifer where silty.

6.4.75 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Natural Gas Connection Corridor Extension.

Electrical Connection Corridor – RBT (Main Site B) Extension

6.4.76 The geology, hydrogeology and contaminated land baseline data detailed for the Electrical Connection Corridor (associated with Main Site A) is relevant for the Electrical Connection Corridor Extension associated with Main Site B, except that publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Electrical Connection Corridor Extension is underlain by the following sequence of strata:

- Made Ground;
- Tidal Flat Deposits (Superficial);

- Glacial Till/Glacio-lacustrine deposits;
 - Mercia Mudstone Group;
 - Penarth Formation; and
 - Redcar Mudstone Formation.
- 6.4.77 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the Electrical Connection Corridor Extension. These deposits are likely to be associated with the land that has been reclaimed from the River Tees and subsequent development as RBT.
- 6.4.78 The Superficial Tidal Flat Deposits underlying the Electrical Connection Corridor Extension are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt. The Devensian Glacial Till Deposits are designated as a Secondary (Undifferentiated) Aquifer. The Alluvial Deposits are designated as a Secondary A Aquifer. The Glaciolacustrine Deposits (clay and silt) underlying the corridor extension are designated as Unproductive Strata where clay and a Secondary A aquifer where silty.
- 6.4.79 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Electrical Connection Corridor Extension.
- Water Connections Corridor – RBT (Main Site B) Extension**
- 6.4.80 The geology, hydrogeology and contaminated land baseline data detailed for the Water Connections Corridor (associated with Main Site A) is relevant for the Water Connections Corridor Extension associated with Main Site B, except that publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Water Connections Corridor Extension is underlain by the following sequence of strata:
- Made Ground;
 - Tidal Flat Deposits (Superficial);
 - Glacial Till/Glacio-lacustrine deposits;
 - Mercia Mudstone Group;
 - Penarth Formation; and
 - Redcar Mudstone Formation.
- 6.4.81 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the Water Connections Corridor Extension. These deposits are likely to be associated with the land that has been reclaimed from the River Tees and subsequent development as RBT.
- 6.4.82 The Superficial Tidal Flat Deposits underlying the Water Connections Corridor Extension are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt. The Devensian Glacial Till Deposits are designated as a Secondary (Undifferentiated) Aquifer. The Alluvial Deposits are

designated as a Secondary A Aquifer. The Glaciolacustrine Deposits (clay and silt) underlying the corridor extension are designated as Unproductive Strata where clay and a Secondary A aquifer where silty.

6.4.83 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Water Connections Corridor Extension.

Other Gases Connection Corridor – RBT (Main Site B) Extension

6.4.84 The geology, hydrogeology and contaminated land baseline data detailed for the Other Gases Connection Corridor (associated with Main Site A) is relevant for the Other Gases Corridor Extension associated with Main Site B, except that publicly available BGS borehole records and geological maps (BGS, 2022) indicate that the Other Gases Connection Corridor Extension is underlain by the following sequence of strata:

- Made Ground;
- Tidal Flat Deposits (Superficial);
- Glacial Till/Glacio-lacustrine deposits;
- Mercia Mudstone Group;
- Penarth Formation; and
- Redcar Mudstone Formation.

6.4.85 The 1:50,000 Artificial Deposits BGS Map (BGS, 2022) indicates that Made Ground (Undivided Artificial Deposit) underlies the Other Gases Corridor Extension. These deposits are likely to be associated with the land that has been reclaimed from the River Tees and subsequent development as RBT.

6.4.86 The Superficial Tidal Flat Deposits underlying the Other Gases Corridor Extension are designated as either a Secondary (Undifferentiated) aquifer when clay or a Secondary A aquifer for sand and silt. The Devensian Glacial Till Deposits are designated as a Secondary (Undifferentiated) Aquifer. The Alluvial Deposits are designated as a Secondary A Aquifer. The Glaciolacustrine Deposits (clay and silt) underlying the corridor extension are designated as Unproductive Strata where clay and a Secondary A aquifer where silty.

6.4.87 There are no SPZs, Drinking Water Protected Areas and Drinking Water Safeguard Zones (Surface Water and Groundwater) within 1 km of the Other Gases Corridor Extension.

Scope of the Assessment

6.4.88 The following potential impacts may be associated with the Proposed Development:

- disturbance of contaminated soils and perched groundwater, and the creation of new pathways to sensitive receptors (including construction workers and controlled waters) during construction;

- pollution of surface watercourses within or near the Proposed Development Site during construction and decommissioning, due to spillages or polluted surface water run-off entering a watercourse (if an appropriate Environmental Management Plan is not adhered to); and
 - pollution of surface watercourses within or near the Proposed Development Site during operation, due to spillages or polluted surface water runoff entering the watercourse (if materials are not appropriately stored at the Proposed Development Site in accordance with the environmental permit and an appropriate Environmental Management Plan/ system, and/or appropriate drainage systems are not implemented and maintained).
- 6.4.89 A Phase 1 desk-based assessment (DBA) has been completed for Main Site A to identify potential contaminative uses of the Proposed Development Site and to identify the potential for land contamination and potential pathways to sensitive receptors. A similar DBA is in preparation for Main Site B. The DBAs consider the potential for contaminants associated with current and historic land use in and around the Proposed Development Site to be present. A conceptual site model (CSM) will be developed for the land potentially affected by the Proposed Development.
- 6.4.90 The results of the DBA and CSM will be used to assess data gaps and uncertainties and, if required, an initial scope for additional site investigation. It is anticipated that the requirements for intrusive investigation would be discussed and agreed in advance with the Environment Agency and RCBC, as appropriate.
- 6.4.91 The ES will include an assessment of the potential impacts of the Proposed Development upon existing ground conditions, including the potential for the Proposed Development to result in land contamination, and how these will be prevented or minimised.
- 6.4.92 The EIA will inform the design as to where mitigation measures may be required during the Proposed Development's construction, operation and decommissioning. These mitigation measure may include the recommendation for further intrusive investigation to address residual data gaps or better delineate identified contamination hotspots or plumes, quantitative risk assessment, remediation and validation, although it is envisaged that the current operator of the Proposed Development Site will undertake appropriate site clean-up prior to commencement of the Proposed Development. The assessment will also make recommendations for possible mitigation measures to be employed by contractors, on a precautionary basis, to allow for the encounter of previously unidentified contamination during the construction phase.
- 6.4.93 The scope of assessment set out above would be applied whether Main Site A or B (and associated corridors) is taken forward to the final development design.
- 6.5 Noise and Vibration
Baseline Conditions

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- 6.5.1 Main Site A is remote from larger areas of residential receptors, with the nearest residential Noise Sensitive Receptor (NSR) to Main Site A located approximately 1.3 km to the east (Marsh House Farm/ Marsh Farmhouse). The nearest residential settlements are the town of Redcar (approximately 2.6 km east of Main Site A), including the borough of Dormanstown (approximately 1.3 km south-east of Main Site A).
- 6.5.2 Main Site B is also remote from larger areas of residential receptors, with the nearest residential NSR to Main Site B located approximately 2.2 km to the east (Marsh House Farm/ Marsh Farmhouse). The nearest residential settlements are the town of Redcar (approximately 3.5 km east of Main Site B), including the borough of Dormanstown (approximately 2.7 km south-east of Main Site B).
- 6.5.3 The nearest residential settlements to the connection corridors are:
- Dormanstown, located approximately 0.4 km to the east of the Water Connections Corridor, approximately 0.7 km to the east of the Hydrogen Pipeline Corridor and Electrical Connection Corridor, approximately 0.9 km to the south-east of the Natural Gas Connection Corridor and approximately 0.9 km to the south-east of the CO₂ Export Corridors;
 - Redcar, located approximately 1.8 km to the north-east of the Electrical Connection Corridor, approximately 2 km to the north-east of the Hydrogen Pipeline Corridor, approximately 2 km to the east of the Natural Gas Connection Corridor and Water Connections Corridor, and approximately 2 km to the east of the CO₂ Export Corridors;
 - Kirkleatham, which is to the immediate east of the Hydrogen Pipeline Corridor, where it extends into the Wilton International Estate;
 - Billingham and Wolviston, located approximately 1.2 km south-west and 0.6 km west of the Hydrogen Pipeline Corridor's western extent respectively;
 - Grangetown, adjacent to the Electrical Connection Corridor at its southern end; and
 - Greatham, located approximately 0.6 km north-west of the Hydrogen Pipeline Corridor.
- 6.5.4 It is noted that there are areas of public/private amenity close to the Proposed Development Site, mainly to the north around Coatham.
- 6.5.5 As outlined in more detail in Section 6.6: Ecology and Nature Conservation, the Teesmouth and Cleveland Coast SPA, Ramsar Site and SSSI is located to the immediate north of both Main Sites A and B. In addition, as outlined in Section 6.7: Ornithology and Section 6.8: Marine Ecology, the Proposed Development has the potential to impact on sensitive receptors relevant to these topics which will need to be considered as part of the assessment.
- 6.5.6 Baseline noise data is available from the results of surveys which were undertaken in 2019 and 2020 for the NZT Project (immediately east of the Proposed
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Development Sites). From a review of the available data, the existing dominant sound in the area is from industrial and road traffic noise sources.

- 6.5.7 Further project specific baseline noise monitoring will be carried out to inform the noise and vibration assessment for the Proposed Development.
- 6.5.8 Consultation with RCBC, STBC and HBC will be undertaken to determine NSRs and the suitability of existing data available for reuse (e.g. from the NZT Project). The extent of the Study Area will be defined to include the NSRs/communities in each direction from the Proposed Development Site, that may be affected by noise or vibration during construction or operation of the Proposed Development.
- 6.5.9 The results of the baseline sound surveys will be reviewed and discussed with consultees to determine whether further baseline monitoring is required. The monitoring locations will also be reviewed to ensure sufficient data is gathered to inform the application for the Environmental Permit for the Production Facility. It is also noted that monitoring surveys need to be carefully scheduled to avoid periods where known noisy activities are taking place in the area, such as demolition works, to not affect the data gathered.
- 6.5.10 Baseline sound survey requirements at identified sensitive ecological receptors will be agreed in conjunction with the project ecologists and Natural England.
- 6.5.11 There are no substantive differences in the baseline conditions between Main Site A and Main Site B. Therefore, the baseline conditions as outlined above apply and are relevant to both. In addition, the proposed baseline sound survey monitoring locations are appropriate to cover both Mains Sites A and B and the associated connection corridors.

Scope of the Assessment

- 6.5.12 The following potential impacts are likely to be associated with the Proposed Development:
- construction and decommissioning noise and vibration impacts (including construction and decommissioning traffic on public roads); and
 - operational noise impacts from new plant, specifically at the Main Site.
- 6.5.13 Based on the distance between the Proposed Development Site and the nearest receptors, significant vibration impacts associated with operational activities are considered unlikely, although they will still be considered in brief as part of the EIA.
- 6.5.14 The scope of the noise and vibration assessment will include the following:
- identification of the nearest NSRs (as outlined above);
 - liaison with the LPA's Environmental Health Officers (EHOs) and the project ecologists to agree scope and methodology of noise and vibration assessment, including baseline sound monitoring locations and measurement protocol (monitoring procedures will conform to BS 7445), including verification of use of existing data;

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- establishment of baseline sound levels in the locality; and
 - assessment of the impact of predicted noise levels at the nearest NSRs from construction, operation and decommissioning of the Proposed Development and associated connections including:
 - construction noise and vibration (including construction traffic on public roads); and
 - operational noise and vibration.
- 6.5.15 The NSRs will be representative of residential and ecological receptors. The data collected will also be used to inform the heritage assessment (with respect to potential impacts upon the settings of heritage assets).
- 6.5.16 The noise and vibration assessment will be carried out in accordance with the following guidance:
- DECC (2011) Overarching NPS for Energy EN-1 and revised NPS EN-1 (BEIS);
 - 'Noise Policy Statement for England' (NPSE) (2010); and
 - PPG for 'Noise' (2019a).
- 6.5.17 Additionally, reference will be made to (but not limited to) the following:
- British Standard (BS) 5228-1 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Part 1: Noise'.
 - BS 5228-2 2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration'.
 - International Organisation for Standardisation (ISO) 9613-2: 1996 'Attenuation of sound during propagation outdoors. Part 2: General method of calculation'.
 - BS 4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.
 - BS 7385: 1993 'Evaluation and measurement for vibration in buildings';
 - BS 6472: 2008 'Guide to evaluation of human exposure to vibration in buildings'.
 - Control of Pollution Act 1974 (as amended).
 - 'Calculation of Road Traffic Noise' (Department for Transport, 1988, "CRTN").
 - Design Manual for Road and Bridges (DMRB) LA111 (Revision 2)' (Highways England, 2020).
- 6.5.18 Noise levels associated with enabling and construction works will be calculated (at chosen NSRs) using the data and procedures given in BS 5228. Further detail on construction working hours will be presented within the PEI Report and ES and will be used to inform the assessment of construction related impacts.
- 6.5.19 The need for prediction of vibration levels will be further considered depending upon the types of activities required during the construction of the Proposed
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- Development. The assessment of vibration due to construction works will include the electrical, water and gas connections as required.
- 6.5.20 The construction of the Proposed Development may have a potential impact on traffic flows on local roads around the Proposed Development Site. The change in road traffic noise levels, at a selection of relevant receptors, will be predicted using the standard methodology outlined in the CRTN. The predictions will be based on baseline and with-development traffic data provided as part of the proposed Transport Assessment (TA) as outlined in Section 6.9: Traffic and Transportation.
- 6.5.21 The significance of changes in road traffic noise levels will be assessed based on a range of relevant guidance including the DMRB.
- 6.5.22 The potential impacts and effects of decommissioning are likely to be comparable to, or less than, those for construction activities.
- 6.5.23 The assessment of operational noise impacts will use computer noise modelling software (SoundPLAN or Cadna-A), based on information on indicative plant layout, and the operating conditions and the levels of noise generated by plant items and vehicles, as provided by the design team. The modelling software enables a detailed implementation of the proposed equipment and buildings, existing surrounding buildings and ground features. The software implements the methodology in ISO 9613-2 for the calculation of noise levels from industrial sources. Any assumptions made to develop the noise modelling will be clearly outlined within the assessment and its technical appendices.
- 6.5.24 The significance of the noise impacts of the Proposed Development during operation will be assessed using the method outlined in BS 4142 and World Health Organisation (WHO) guidance (WHO, 2009). BS4142 provides a method for rating the acceptability of increases in existing noise levels at noise-sensitive receptors affected by noise from industrial sources at proposed developments, and the WHO guidance provides information regarding assessment of sleep disturbance. Further details of the approach will be discussed and agreed as required with RCBC and STBC.
- 6.5.25 Additionally, the tonal, impulsive and irregular characteristics of the noise emissions from the Production Facility will be considered and assessed against the prevailing noise climate to the NSRs.
- 6.5.26 As outlined in Section 6.9: Traffic and Transportation, the Proposed Development is unlikely to have a significant impact upon traffic flows on local roads around the Proposed Development Site during operation. Therefore, it is proposed to scope this out of the assessment of noise and vibration.
- 6.5.27 Development design and impact avoidance measures will be used to inform the assessment of likely significant effects. These measures have not been fully defined for the Proposed Development. However, for noise this is likely to include standard best practices approaches such as avoidance of working in the more sensitive evening and night-times where possible. All measures will be outlined with the CEMP.
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6.5.28 Any likely remaining significant adverse effects will be mitigated where possible through further mitigation. Following the implementation of mitigation any residual effects on residential and ecological receptors will be identified.

6.5.29 The scope of assessment set out above would be applied whether Main Site A or B (and their associated corridors) are taken forward to the final development design.

6.6 Ecology and Nature Conservation (Including Aquatic Ecology)

Baseline Conditions

6.6.1 The baseline for Ecology and Nature Conservation is considered against the 'Zone of Influence' (Zoi) for the Proposed Development which is the area over which ecology and nature conservation features may be affected by biophysical changes because of the Proposed Development and associated activities (Chartered Institute of Ecology and Environmental (CIEEM), 2022). This approach will be the same regardless of which Main Site (A or B) is selected. Therefore, the Study Area for baseline data gathering has been defined on a precautionary basis to obtain sufficient data to determine the Zoi for the purpose of the ecological impact assessment (EclA) for either scenario. The approach taken is described below.

6.6.2 A 15 km Study Area around the Proposed Development Site has been applied to identify European Sites, SSSIs and NNRs that need to be considered in terms of the potential for impacts and effects (including for purposes of Habitats Regulations Assessment (HRA)), particularly those with mobile species such as birds³ or marine mammals⁴. The assessment will initially consider features within a potential Zoi of up to 15 km based upon guidance for air quality impact assessment during operation as outlined in Section 6.2: Air Quality of this report.

6.6.3 The Study Area for the identification of local statutory and non-statutory nature conservation sites, and for gathering third party records of habitats and protected and notable species is a more focussed area of 2 km around the Proposed Development Site. This distance is again informed by standard guidance for air quality impact assessment and other good practice (CIEEM, 2017 & 2022). The potential Zoi for the Proposed Development will be refined further later for the purposes of the final EclA.

6.6.4 The desk study areas are summarised in Table 6-2.

6.6.5 The field survey area will include all land within the extent of the Proposed Development Site (subject to access) plus at least a 50 m buffer to place the Proposed

³ Note as ornithology will be a separate stand-alone chapter, further information on the baseline and scope of assessment of specific relevance to ornithology is outlined separately in Section 6.7 of this EIA Scoping Report.

⁴ Note as marine ecology will be a separate stand-alone chapter further information on the baseline and scope of assessment of specific relevance to marine ecology is outlined separately in Section 6.8 of this EIA Scoping Report.

Development Site in its wider habitat context, and to appraise habitat suitability for those protected species that are potentially sensitive to indirect impact sources (e.g. noise or visual disturbance). The species-specific survey areas to be observed are detailed later in this section, in Table 6-2: Summary of Ecological Surveys and Data Collection (Including Ornithology and Aquatic Ecology).

Table 6-2 Sources of Desk Study Data⁵

DATA SOURCE	SEARCH AREA	ACCESSED / DATA RECEIVED	DATA OBTAINED
Environmental Records Information Centre (ERIC) North East	2 km	August 2022	Species records, non-statutory sites, and the associated interest features/reasons for designation.
Industry Nature Conservation Association (INCA)	Data specific	23 March 2022	Species records, roost and breeding site locations for birds and protected and notable species.
Multi Agency Geographic Information for the Countryside (MAGIC) (Defra, 2022)	Up to 15 km	November 2022	15 km for European Sites, SSSIs and NNRs. 2 km for all other features (local statutory designations, ancient woodland, European Protected Species records, priority habitats).
Joint Nature Conservation Committee (JNCC) website (JNCC, 2022)	Up to 15 km	November 2022	Reasons for designation and other information on European and Ramsar sites.
Natural England Designated Sites View website (Natural England, 2022b)	Up to 15 km	November 2022	Reasons for designation and other information on statutory designated sites.
Net Zero Teesside DCO, available on the Planning Inspectorate Website (AECOM, 2021)	Data Specific	November 2022	Habitat and species data.

⁵ Sources of Desk Study Data of specific relevance to ornithology are outlined separately in Section 6.7, however it is noted that there will be some overlap in the use of certain sources of data across all of the ecology chapters.

DATA SOURCE	SEARCH AREA	ACCESSED / DATA RECEIVED	DATA OBTAINED
Environment Agency Ecology and Fish Data explorer (EA, 2022d)	2 km	November 2022	Detailed count data for fish, records of aquatic macroinvertebrates, invasive species and aquatic plants.
National Biodiversity Network (NBN) Atlas explorer website (NBN Atlas, 2022)	2 km	November 2022	Species data

Statutory Designated Sites

6.6.6 As illustrated on Figure 13: Statutory Designated Sites within 15 km of the Proposed Development Site Boundary (Appendix A) there are the following European Sites, SSSIs and NNRs:

- Three SPAs:
 - Teesmouth and Cleveland Coast SPA, part of which falls within the Proposed Development Site;
 - North York Moors SPA, located approximately 7.9 km south-east of the Proposed Development Site; and
 - Northumbria Coast SPA, located approximately 10.4 km north-west of the Proposed Development Site.
- Three SACs:
 - North York Moors SAC, located approximately 7.9 km south-east of the Proposed Development Site;
 - Durham Coast SAC, located approximately 10.4 km north-west of the Proposed Development Site; and
 - Castle Eden Dene SAC, located approximately 13.5 km north-west of the Proposed Development Site.
- Two Ramsar sites:
 - Teesmouth and Cleveland Coast Ramsar site, part of which falls within the Proposed Development Site; and
 - Northumbria Coast Ramsar site, located approximately 10.5 km north-west of the Proposed Development Site.

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- 20 SSSIs:
 - Teessmouth and Cleveland Coast SSSI, some of which is located within the Proposed Development Site;
 - Lovell Hill Pools SSSI, located approximately 2.4 km south-east of the Proposed Development Site;
 - Briarcroft pasture SSSI, located approximately 7.7 km west of the Proposed Development Site;
 - Roseberry Topping SSSI, located approximately 8 km south of the Proposed Development Site;
 - North York Moors SSSI, located approximately 8 km south-east of the Proposed Development Site;
 - Saltburn Gill SSSI, located approximately 8.2 km south-east of the Proposed Development Site;
 - Whitton Bridge Pasture SSSI, located approximately 8.3 km west of the Proposed Development Site;
 - Langbaugh Ridge, located approximately 8.4 km south of the Proposed Development Site;
 - Cliff Ridge SSSI, located approximately 9 km south of the Proposed Development Site;
 - Durham Coast SSSI, located approximately 9.1 km north of the Proposed Development Site;
 - Hart Bog SSSI, located approximately 9.5 km north of the Proposed Development Site;
 - Pike Whin Bog SSSI, located approximately 10.4 km north-west of the Proposed Development Site;
 - Kildale Hall SSSI, located approximately 11.6 km south of the Proposed Development Site;
 - Hulam Fen SSSI, located approximately 12 km north of the Proposed Development Site;
 - Castle Eden Dene SSSI, located 13.5 km north of the Proposed Development Site;
 - Pinkney and Gerrick Woods SSSI, located approximately 13.6 km south-east of the Proposed Development Site;
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- Fishburn Grassland SSSI, located approximately 13.8 km north-west of the Proposed Development Site;
 - Charity Land SSSI, located approximately 13.9 km north-west of the Proposed Development Site;
 - Newton Ketton Meadow SSSI, located approximately 14.6 km west of the Proposed Development Site; and
 - Boulby Quarries SSSI, located approximately 14.9 km south-east of the Proposed Development Site.
- Three NNRs:
 - Teemouth NNR, some of which is located within the Proposed Development Site;
 - Durham Coast NNR, located approximately 9.5 km north-west of the Proposed Development Site; and
 - Castle Dene NNR, located approximately 13.5 km north-west of the Proposed Development Site.

6.6.7 There are five LNRs within 2 km of the Proposed Development Site, namely:

- Cowpen Bewley Woodland Country Park LNR, part of which is located within the Proposed Development Site;
- Charlton's Pond LNR, located approximately 0.5 km west of the Proposed Development Site;
- Seaton Dunes and Common LNR, located approximately 1.3 km north-east of the Proposed Development Site;
- Billingham Beck Valley LNR, located approximately 1.4 km west of the Proposed Development Site; and
- Greatham Beck LNR, located approximately 1.8 km north-west of the Proposed Development Site.

Non-Statutory Designated Sites

6.6.8 There are 22 Local Wildlife Sites (LWS') within 2 km of the Proposed Development Site:

- Eston Pumping Station LWS and Greatham Creek North Bank Saltmarsh LWS, which are wholly located within the Proposed Development Site;
- Coatham Marsh LWS, Cowpen Bewley Woodland Park LWS, Greenabella Marsh LWS, Philips Tank Farm Grassland LWS and Saltern Saltmarsh LWS, which are partially located within the Proposed Development Site;

- Queens Meadow Wetland LWS, located approximately 0.2 km north of the Proposed Development Site;
 - Tot Fenny's Meadow LWS, located approximately 0.4 km west of the Proposed Development Site;
 - Billingham Norton Bottoms Reedbed Treatment System LWS, located approximately 0.7 km south of the Proposed Development Site;
 - Brenda Road Sewage Works Grassland LWS, located approximately 0.7 km north of the Proposed Development Site;
 - Norton Bottoms LWS, located approximately 0.8 km west of the Proposed Development Site;
 - Brenda Road Brownfield LWS, located approximately 0.8 km north of the Proposed Development Site;
 - Power Station Grassland and Wetland LWS, located approximately 0.9 km north of the Proposed Development Site;
 - Teessaurus Park LWS, located approximately 0.9 km east of the Proposed Development Site;
 - Seaton Common LWS, located approximately 1.1 km north of the Proposed Development Site;
 - Wilton Woods Complex LWS, located approximately 1.2 km south of the Proposed Development Site;
 - Portrack Meadows LWS, located approximately 1.3 km south of the Proposed Development Site;
 - Zinc Works Bird Field LWS, located approximately 1.3 km north of the Proposed Development Site;
 - Billingham Beck Valley Country Park LWS, located approximately 1.4 km west of the Proposed Development Site;
 - Greatham Beck LWS, located approximately 1.6 km north-west of the Proposed Development Site; and
 - Portrack Marsh LWS, located approximately 1.7 km south of the Proposed Development Site.
- 6.6.9 As part of the ecological desk study, the presence of all relevant non-statutory designated sites will be determined and the details will be provided with the PEI Report.
- 6.6.10 Other ecologically sensitive habitat sites such as RSPB reserves will also be identified through the ecological desk study and assessed within the EclA.

Habitats

6.6.11 There are desk study records of the following known or potential terrestrial and freshwater Habitats of Principal Importance (HoPIs) within the Proposed Development Site:

- open mosaic habitat on previously developed land;
- coastal sand dunes;
- mudflats;
- coastal and floodplain grazing marsh;
- coastal saltmarsh;
- saline lagoons;
- ponds; and
- deciduous woodland.

6.6.12 The habitats present within the Proposed Development Site, including any HoPI, will be confirmed through the Phase 1 Habitat Survey. This survey will be undertaken with reference to the standard methodology (JNCC, 2010). The Phase 1 habitat survey results will be aligned with the modified UK Habitat (UKHab) Classification used for the purposes of Biodiversity Net Gain (BNG) site condition assessment with reference to the current iteration of the standard methodology (currently this is Biodiversity Metric 3.1 (Natural England, 2021)).

6.6.13 Habitat surveys will be completed for locations where permanent infrastructure may be constructed as part of the Proposed Development, along the proposed connection corridors, and temporary construction laydown areas. Data will also be collected for a 50 m buffer around the Proposed Development Site. The scope of the planned habitat surveys is set out in Table 6-3: Summary of Ecological Surveys and Data Collection (Including Ornithology and Aquatic Ecology).

Protected and Notable Species

6.6.14 It is anticipated that some habitats within the ZOI of the Proposed Development Site will have suitability to support protected and notable species including bats, badger *Meles*, otter *Lutra lutra*, water vole, reptiles *Arvicola amphibius*, great crested newt *Triturus cristatus*, fish, aquatic macroinvertebrates and plants. While some desk study data is available for species, the coverage is partial and often there is a lack of precision on whether these species occur in relation to the Proposed Development Site. To address this a suite of species surveys will be completed as outlined in Table 6-3: Summary of Ecological Surveys and Data Collection (including Ornithology and Aquatic Ecology).

6.6.15 Great crested newt is scoped out as a protected species constraint for all parts of the Proposed Development Site located to the south of the River Tees. This approach has been informed by prior advice received in relation to the NZT project (as detailed in AECOM, 2021). For that project, the Industry Nature Conservation Association (INCA) advised that there are no known occurrences of great crested newt in the South Tees area of Redcar and Cleveland and that it is well established that great crested newt

surveys are not required to support planning applications in the South Tees area. This species is to be considered further in relation to the parts of the Proposed Development Site located to the north of the River Tees.

- 6.6.16 The scope of the planned (and ongoing) ecology surveys is set out in Table 6-3. The survey methodologies will follow Natural England standing advice, CIEEM best practice guidance and industry guidance for protected species survey.

Invasive Non-Native Species (INNS)

- 6.6.17 Checks will be made for INNS during the habitat surveys and during the aquatic ecology surveys and will be listed in the subsequent reports for consideration in the EclA.

Scope of the Assessment

- 6.6.18 The following potential impacts and their resulting effects on ecology and nature conservation features will be considered within the EclA for the Proposed Development:
- temporary disturbance impacts and permanent loss and degradation of nature conservation designations and other relevant terrestrial habitats (including Functionally Linked Land) within the Proposed Development Site during construction, and within the wider Zol where potential pathways for impact extend beyond the Proposed Development Site;
 - direct and indirect impacts on relevant protected and notable species, e.g. as a result of injury, temporary or permanent lighting, habitat loss or noise and visual disturbance, during construction and operation;
 - temporary water quality (sediment run-off, other possible emissions to water) and air quality impacts (dust emissions, emissions from construction traffic movements) on relevant habitats and species during construction; and
 - long-term air quality impacts on nature conservation designations in the vicinity of, or downwind of, the Proposed Development Site during operation.

Table 6-3: Summary of Ecological Surveys and Data Collection (Including Ornithology and Aquatic Ecology)

SURVEY	SCOPE	SURVEY TIMING	SURVEY EXTENTS
Phase 1 habitat survey and Habitat Condition Assessment to inform Biodiversity Net Gain (BNG) Assessment.	<p>A Phase 1 Habitat Survey will be conducted in accordance with the published method (JNCC, 2010). It will be supplemented by a BNG site condition assessment to meet data needs for subsequent BNG assessment.</p> <p>An assessment of habitat suitability for protected and notable species will also be made to inform the iterative scoping of detailed protected and notable species surveys.</p> <p>Record of Invasive Non-Native Species (INNS) of plants and incidental records of protected or priority species or their field signs will be made. The surveys will be supplemented by aerial habitat mapping.</p> <p>The information will confirm the ecological baseline and form the basis of the calculation of potential permanent and temporary habitat effects within the EclA and for purposes of the BNG assessment.</p>	Optimal time – April to October but can be carried out at any time of year.	Accessible terrestrial habitats within the Proposed Development Site.
Non-breeding birds within the scoping boundary and functionally linked land	Monthly wintering and passage surveys of terrestrial habitats and wetland (including intertidal and non-tidal) up to 1 km from the pipeline routes will be undertaken, using a variant of the Wetland	Between October 2022 and March 2023, and August – October 2023. ⁷	Intertidal; tidal saltmarsh; other tidal and non – tidal wetland habitats; and terrestrial habitats up to a maximum of

⁷ Initial engagement with Natural England on 14th February 2022 confirmed that a full season of wintering bird survey data would be required. Given the presence of qualifying features of the Teesmouth and Cleveland Coast Ramsar, SPA and SSSI all year round, agreement was reached that 12 months of survey data would be appropriate, supplemented where necessary by the available third party data available from multiple sources including (but not necessarily limited to) Natural England, the Environment Agency, INCA, ERIC Northeast and baseline data supporting other planning applications and DCOs within the Study Area.

SURVEY	SCOPE	SURVEY TIMING	SURVEY EXTENTS
	<p>Birds Survey (WeBS)⁶ method, supplemented with a 'look-see' or field count method.</p> <p>These will be carried out each month at low and high tides. Third party data from online sources and data providers will be used to supplement the baseline survey data. Includes all habitats that may be subject to permanent or temporary habitat losses and disturbance during construction and operation of the Proposed Development and for which sufficient data to inform impact assessment cannot be obtained from third parties.</p>		<p>approximately 1km⁸ from the Proposed Development Site boundary.</p>
<p>Breeding birds within the Proposed Development Site and in functionally linked land</p>	<p>Monthly surveys using the above methodology would be completed. Spring passage birds will also be recorded during these surveys. Breeding bird surveys will be carried out within terrestrial habitats likely to support assemblages of breeding birds, using an appropriate methodology⁹, at locations of permanent habitat loss and/or significant disturbance (such as locations of permanent above ground infrastructure and working areas where habitats capable of</p>	<p>Between March 2023 and July 2023.</p>	<p>As above for non-breeding birds.</p> <p>Survey areas for breeding terrestrial birds, if required, will be determined in more detail as the Proposed</p>

⁶ The Wetland Bird Survey (WeBS) is the long-term monitoring scheme for non-breeding waterbirds in the UK, which aims to provide the principal data for the conservation of their populations and wetland habitats. WeBS is a partnership between the British Trust for Ornithology, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee (the last on behalf of Natural England, Natural Resources Wales, Scottish Natural Heritage and the Department of the Environment Northern Ireland) in association with the Wildfowl and Wetlands Trust. Core counts are synchronised monthly counts undertaken at wetlands throughout the UK. The surveys generate counts of water birds within pre-defined count sectors. Survey methods are available at BTO (n.d.)

⁸ Plus some areas of permanently submerged offshore habitat adjacent to Coatham Sands and Bran Sands further than 1 km from the Proposed Development Site.

⁹ Such as the Common Birds Census (Marchant, 1983).

SURVEY	SCOPE	SURVEY TIMING	SURVEY EXTENTS
	supporting breeding birds may be affected for extended periods of time).		Development design progresses.
Great crested newt – District Level licensing (DLL) and / or habitat suitability assessments.	In relation to the area of the Proposed Development Site to the north of the River Tees it is proposed to consult Natural England to confirm whether a DLL approach will be available for this project. If not, a desk-based exercise will be undertaken to map and categorise all waterbodies within 250m of the Proposed Development. Habitat Suitability Index (HSI) assessments of ponds in accordance with Oldham <i>et al.</i> (2000) will be undertaken. Data collected by the desk study and online information where this may be available (i.e. European protected species mitigation licence information and Natural England Open data sources, will also be reviewed).	Consultation with Natural England can be undertaken at any time. HSI assessments are proposed to be undertaken in combination with Phase 1 Habitat Survey where land parcels coincide.	All suitable waterbodies within 250m of proposed connection corridors.
Great crested newt presence / likely absence survey and population assessment surveys	In relation to the area of the Proposed Development Site to the north of the River Tees (proposed connection corridors). Where possible, environmental DNA (eDNA) surveys will be undertaken in accordance with the protocols as set out by Biggs <i>et al.</i> (2014). Where eDNA survey may not be practicable at specific waterbodies (e.g. water too shallow for sampling) consideration of the need to undertake traditional presence/absence survey techniques will be made. Where necessary standard presence/absence surveys utilising four visits will be undertaken in accordance with the standard survey methodology (English Nature, 2001). Population size class assessment surveys will be completed where this species is confirmed present (six survey visits of waterbodies with positive eDNA result or known to support this species based on desk-based data) in accordance with standard guidance (English Nature, 2001; Natural England, 2022a).	eDNA: 15 th April to 30 th June 2023. Traditional presence/absence surveys: Mid-March to mid-June 2023. These surveys may need to be commenced prior to receipt of eDNA survey results being received in order to achieve required timings.	Suitable waterbodies within 250 m of the Proposed Development Site north of the Tees. The locations of ponds requiring survey will be informed by the outcome of the HSI and eDNA.
Bats - Preliminary Roost Features (PRF) assessment	Permanent impacts on trees will be avoided where possible. Trees to be directly impacted will be subject to a PRF assessment survey in accordance with The Bat Conservation Trust (BCT) guidance (Collins <i>et</i>	Any time of year.	The Phase 1 habitat survey will inform the

SURVEY	SCOPE	SURVEY TIMING	SURVEY EXTENTS
	<p><i>al.</i>, 2016). Should a structure or building be impacted this will also be subject to PRF assessment in accordance with BCT Guidance (Collins <i>et al.</i>, 2016).</p> <p>Information collated on the location of trees that are suitable for roosting bats will inform design and offset buffers to avoid direct effects upon potential roost sites. Furthermore, the PRF assessment information will form the basis of the scope for roost surveys (as detailed below).</p>		<p>extent of areas requiring PRF assessment.</p>
<p>Bats – Foraging / Commuting</p>	<p>Habitats will be appraised for their suitability to support foraging and commuting bats during the extended Phase 1 habitat survey.</p> <p>Activity surveys will be undertaken with reference to published guidance (Collins <i>et al.</i>, 2016) only where permanent effects upon suitable habitats are predicted.</p> <p>It is not considered necessary to undertake detailed bat activity surveys along the connection routes given the temporary nature of habitat loss, and the avoidance of the removal of mature trees or other structures which may support roosting bats.</p> <p>Where linear habitat features (e.g. watercourses/hedgerows) are affected by the Proposed Development, but which may provide commuting routes or a foraging resource for bats, appropriate robust and precedented mitigation measures can be secured via adoption of construction methods that seek to avoid these features and reduce the temporary effects to a level that would not be significant.</p> <p>Therefore, surveys are not considered necessary.</p>	<p>If required: April/May to September 2022 inclusive.</p>	<p>Limited to areas of suitable habitat which will be permanently lost to facilitate the Proposed Development.</p>
<p>Bats – roosting</p>	<p>It is likely that the Proposed Development will be able to avoid trees with PRFs that have potential to support a bat roost. However, where this is not possible, trees will be subject to climbing and assessment of the identified PRF features where safe to do so, to confirm if the tree could be used as a roost and/ or if there are signs of bats.</p>	<p>Any time of year. If required, between April/May and September 2023.</p>	<p>Features with bat roost suitability identified during the Phase 1 Habitat Survey.</p>

SURVEY	SCOPE	SURVEY TIMING	SURVEY EXTENTS
	<p>Where tree climbing confirms that the PRF does have potential to support a roost and/or where it is not possible to safely climb a tree, bat emergence/re-entry surveys will be undertaken at dusk and dawn in accordance with standard survey guidance (Collins <i>et al.</i>, 2016; Bat Conservation Trust 2022).</p> <p>To determine appropriate mitigation, and EPSM licensing requirements, if necessary, where trees with confirmed/potential bat roosts cannot be entirely avoided.</p>		
Badger	<p>A presence/absence survey for setts and field signs will be conducted in combination with the Phase 1 habitat survey. The survey will focus on habitat suitable to support setts. Incidental records obtained through desk study data in combination with the completion of other surveys will also supplement the baseline assessment.</p>	<p>Any time of year – and will be combined with the Phase 1 Habitat Survey.</p>	<p>The Proposed Development Site plus a 50 m buffer.</p>
Otter and Water Vole	<p>Presence/absence surveys based on Dean <i>et al.</i> (2016) and Chanin (2003) will be conducted to , looking for field signs along watercourses and ditches where open cut crossing techniques will be required, will be conducted. A spring survey will be completed, with a second survey as required to confirm presence/ likely absence.</p>	<p>Otter surveys can be completed at any time. Water Vole – spring survey before end of June 2023; and if required a second survey before end September 2023.</p>	<p>Up to 500 m length of the watercourse – 250 m up and down stream of crossing point.</p>
Reptiles	<p>A desk-based habitat assessment (using aerial mapping and data sources for reptile records/mapping for the area/county) will be undertaken to highlight potential areas of interest for reptiles within the Proposed Development Site. These areas will then be subject to assessment for their potential to support reptiles as part of the Phase 1 Habitat Survey based on technical guidance by ARC Trust (Sewell <i>et al.</i>, 2013).</p> <p>Where habitats appear suitable for reptile populations and are to be permanently affected by the Proposed Development, presence/absence surveys will be undertaken following guidance</p>	<p>If required: Optimal – April to middle of June and September. However, surveys will be carried out between April and September inclusive depending on the weather.</p>	<p>Only likely required at potential permanent infrastructure locations – subject to the findings of the Phase 1 Habitat Survey.</p>

SURVEY	SCOPE	SURVEY TIMING	SURVEY EXTENTS
	<p>provided by in Froglife Advice Sheet 10: Reptile Surveys (Froglife, 1999). Survey involves laying refugia (carpet tiles/roof felts) and leaving them in situ for 1-3 months. They will be checked 7 times and then removed after the last survey.</p> <p>Presence/absence reptile surveys will only be considered warranted where areas of moderate/ high value reptile habitat cannot be avoided by the Proposed Development. These data will inform the EclA and mitigation strategy. Temporary construction effects upon small areas of suitable reptile habitat will be able to be mitigated through appropriate pre-construction measures (e.g. supervised vegetation clearance at an appropriate time of year).</p>		
Freshwater species (Aquatic Ecology)	<p>The scope and requirements for specific surveys will be informed by an aquatic scoping survey, and would consider requirements for surveys of ditches, watercourses, and ponds within the Proposed Development Site.</p> <p>The initial scoping surveys will identify where further surveys are required for fish, aquatic macroinvertebrates, aquatic plants, and pond Predictive System of Multimetrics (PSYM), including INNS.</p>	<p>Macroinvertebrates: Spring (April – May 2023) and Autumn (November 2022); Macrophytes: June – September 2023; Pond PSYM: Summer (June – August 2023).</p>	<p>Waterbodies within the Proposed Development Site that are likely to be impacted.</p>
Terrestrial Invertebrates	<p>The scope of survey will depend upon the habitat type and target invertebrate species. Requirements for invertebrate surveys will be reviewed as part of the desk study/extended Phase 1 Habitat survey scope.</p>	<p>If required, surveys will be completed between April and September.</p>	<p>Subject to findings of the Phase 1 Habitat Survey and value of habitats to terrestrial invertebrates – focused on areas of permanent habitat loss.</p>
Plants	<p>Surveys for protected and notable plants would be undertaken if appropriate based on the findings of the habitat surveys. Any specific relevant occurrences of notable plants identified by the desk study would also be targeted for survey.</p>	<p>Summer 2023 (June-August 2023).</p>	<p>Relevant habitats as identified by the Phase 1 Habitat survey. Locations indicated by the desk study results.</p>

SURVEY	SCOPE	SURVEY TIMING	SURVEY EXTENTS
	Pond plants will be identified as part of the pond PSYM method which requires the identification of aquatic plants and macroinvertebrates. Aquatic plant INNS will also be assessed.		Accessible ponds within the Proposed Development Site that are likely to be impacted.

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- 6.6.19 Considering the above, an assessment of terrestrial and freshwater ecology and nature conservation is scoped into the future impact assessment.
- 6.6.20 The EclA will be undertaken in accordance with good practice guidance issued by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2022). It will not be necessary in the assessment to address all ecological features with potential to occur, and instead the focus should be on those that are 'relevant'.
- 6.6.21 CIEEM (2022) makes clear that there is no need to "*carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable*". This does not mean that efforts would not be made to safeguard wider biodiversity, and requirements in support of this would be considered. National policy documents emphasise the need to achieve no net loss of biodiversity and enhancement of biodiversity.
- 6.6.22 The results of the ecological desk study, the habitat and species surveys, and the outcomes of any consultation responses will be used to inform the relevant ecological features to be addressed in the EclA.
- 6.6.23 To support focussed EclA there is a need to determine the scale at which the relevant ecological features are of value. Consistent with good practice (CIEEM, 2022), the value of each relevant ecological feature will be defined with reference to the geographical level at which it matters. The frames of reference used for this assessment are therefore:
- International (typically this is within a European context, reflecting the general availability of good data to allow cross-comparison);
 - National (Great Britain, but considering the potential for certain features to be more notable (of higher value) in an England context relative to Great Britain as a whole);
 - Regional (North-East England);
 - County (Tees Valley);
 - District (Redcar and Cleveland, Stockton-on-Tees and Hartlepool);
 - Local (features that do not meet criteria for valuation at a District or higher level, but that have sufficient value at the site level to merit retention or mitigation); and
 - Negligible (common and widespread features that have very low value at the level of the Proposed Development Site, and which do not require retention or mitigation at the relevant location to otherwise maintain a favourable nature conservation status, or to deliver wider relevant biodiversity objectives and can be screened out).
- 6.6.24 Design and impact avoidance measures will be used to inform the assessment of likely significant effects. These measures will be defined later in the EIA process but would include consideration of options to minimise impacts to relevant terrestrial and freshwater ecology features or otherwise to achieve legislative compliance (e.g.
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in relation to dust management or water quality). Measures during construction, including best practice, will be included and implemented through the CEMP or permitting regimes.

- 6.6.25 Any remaining significant adverse effects will be mitigated or compensated for, and ecological enhancements may be recommended where appropriate. Following the implementation of mitigation and compensation, any residual effects on relevant ecological features will be identified.
- 6.6.26 The scope of assessment set out above would be applied whether Main Site A or B (and their associated corridors) are taken forward to the final development design. The specific survey requirements relevant to the Main Sites may differ slightly, but overall, the approach to the assessment for both sites would be the same.

Habitats Regulations Assessment

- 6.6.27 A HRA will be undertaken to assess whether the Proposed Development is likely to have a significant effect on European Sites. The need to undertake HRA is implemented in English and Welsh law by the Conservation of Habitats and Species Regulations 2017 (as amended).
- 6.6.28 Stage 1 of the HRA process (Test of Likely Significant Effects) will consider the potential pathways of effect between the Proposed Development and European Sites within 15 km of the Proposed Development Site (on the basis that it is unlikely that a project such as this will affect sites further afield), and whether there is potential to have a significant adverse effect on the integrity of the European Sites, 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 outlined in Table 6-3 (as well as the surveys identified below in Section 6.7: Ornithology and Section 6.8: Marine Ecology).
- 6.6.29 Where there is potential for the Proposed Development to have a significant effect upon the qualifying features of European Sites, the pathway will be taken forward to Stage 2 – Appropriate Assessment. At Appropriate Assessment, the measures that will be implemented to either avoid the impact in the first place, or to mitigate the ecological effect to such an extent that it is no longer significant, will be set out.
- 6.6.30 The HRA will be prepared in line with Planning Inspectorate (2022) Advice Note 10 (Habitats Regulations Assessment) including completion of the necessary matrices. The HRA process will be in line with the EIA process. There would be a 'Test of Likely Significant Effects Report' at the PEI Report stage, and this will be updated as necessary for the Application including a report to inform Appropriate Assessment, if required.
- 6.6.31 The scope of the report to inform the HRA will be determined through consultation with Natural England and other key stakeholders. It is recognised that HRA is a multi-stage process and, therefore, the Applicant will continue to consult with Natural England as the HRA progresses.

Biodiversity Net Gain Assessment

6.6.32 Schedule 15 of the Environment Act 2021 makes provision for BNG in relation to development consent for NSIPs. The requirement for BNG for NSIPs will not become mandatory until 2025, however this project will aspire to achieve a net gain in biodiversity. A BNG assessment will be undertaken for the Proposed Development in accordance with the published Natural England (currently this is Biodiversity Metric 3.1 (Natural England, 2022c)).

6.7 Ornithology

Baseline Conditions

Statutory and Non- Statutory Designated Sites

6.7.1 The statutory and non-statutory designated sites relevant to ornithology are summarised in Section 6.6: Ecology and Nature Conservation and are not repeated here.

Species

6.7.2 Preliminary baseline data gathering was carried out to inform the initial design phase of the Proposed Development, between August 2021 and March 2022, by means of a desk study and a limited suite of non-breeding wetland bird surveys.

6.7.3 Sources of desk study information are summarised in Table 6-4..

Table 6-4: Sources of Desk Study Data Relevant to Ornithology¹⁰

DATA SOURCE ¹¹	SEARCH AREA ¹²	ACCESSED/D ATA RECEIVED	DATA OBTAINED
Environmental Records Information Centre (ERIC) North East	Up to 2 km	11 th August 2021	Bird records
Industry Nature Conservation Association (INCA)	Data specific	23 rd March 2022	Bird records, roost and breeding site locations for several species.

¹⁰ As outlined in Section 6.6: Ecology and Nature Conservation (Table 6-2) there will be some overlap in the use of certain sources of data across all of the ecology chapters so not all are repeated here again.

¹¹ Further data will be requested, as required, to address the current extent of the Proposed Development, as stated in paragraph 6.1.213

¹² Search areas are expressed as a radius from the collective boundaries of the preliminary Proposed Development area identified in January 2022 which was larger than the Proposed Development Site. WeBS data are typically requested for a minimum of 500 m from the Proposed Development, however this distance is adjusted where appropriate to account for continuity and connectivity of habitats, the spatial context of WeBS count sectors in relation to the Proposed Development, consistency and/or age of count data and the Zone of Influence of potential impacts of the proposed Development.

DATA SOURCE ¹¹	SEARCH AREA ¹²	ACCESSED/DATA RECEIVED	DATA OBTAINED
British Trust for Ornithology Wetland Birds Survey (WeBS) (BTO, 2022)	Data specific	10 th May 2022	Detailed count data for wetland birds occurring within selected wetland habitat count areas across Teesside.

6.7.4 Wetland bird counts were completed between January and March 2022 (inclusive), within the broad areas summarised in Table 6-5.

Table 6-5: Summary of Ornithology Surveys Completed to Date

SURVEY AREA	JANUARY 2022	FEBRUARY 2022	MARCH 2022
The Foundry (Main Site) and adjacent coastal/wetland habitats	1 High Tide 1 Low Tide	2 High Tide 2 Low Tide	2 High Tide 2 Low Tide
Seal Sands Bay and adjacent coastal/wetland habitats	No surveys	2 High Tide 2 Low Tide	2 High Tide 2 Low Tide

6.7.5 The entirety of the Teesside coast can be considered to support significant populations of non-breeding birds and populations of some breeding water birds for which the Teesmouth and Cleveland Coast SPA, Ramsar and SSSI are designated. Furthermore, the baseline data gathered to date have identified some locations or broad areas in proximity to the Proposed Development Site that are very sensitive due to the reliance of birds on them during either during potentially adverse tide and/or weather conditions, or on a regular basis irrespective of the conditions.

6.7.6 Within the Foundry survey area these include:

- Dabholm Gut, which supports large numbers of feeding waders and ducks;
- Bran Sands Lagoon, which supports roost a range of roosting and feeding waders, ducks and gulls;
- Bran Sands Bay, which regularly supports feeding waders and other water birds, and includes several regularly used roosts; and
- the northern edge of Coatham Dunes and the wider coastline of Coatham Sands, which provides feeding and roosting habitat for several species of wader, terns and a wide range of other water birds.

6.7.7 Within the Seal Sands survey area these include:

- the entirety of Seal Sands Bay and its periphery, including the sea wall and the promontory/spit of land at its eastern extent and some of the grasslands immediately to the south of the bay, which are used predominantly by roosting and feeding waders;

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- Greenabella Marsh, to the west of the bay, the pools within which are used by several species of feeding and roosting waterbirds, and by several species of breeding water bird; and
 - the pools and grasslands immediately south-west of the bay, which support feeding and roosting waders.
- 6.7.8 West of Seal Sands, the area collectively known as the North Tees Marshes, which includes Greatham Creek channel and the adjacent expanses of saltmarsh, supports large numbers of feeding and roosting waders, ducks, geese and other water birds, plus colonies of breeding waders and terns.
- 6.7.9 The baseline data gathered to date suggest that neither of the main sites being considered support more than small numbers of coastal and wetland birds, however some differences between the two sites can be determined at this stage. Main Site A supports very little semi-natural habitat and is within an area subject to ongoing industrial workings, building demolition, vehicle movements and continuous disturbance from human activity. The only species recorded in this area during wetland bird counts have been small numbers of gulls, mostly within the northern half of the site during high tide surveys. Herring gull (*Larus argentatus*) and black-headed gull are qualifying assemblage species of Teesmouth and Cleveland Coast SPA in winter.
- 6.7.10 Main Site B supports worked areas and infrastructure in its southern half and, along its northern edge, semi-natural habitats including grassland, a small pond with reedbed, scattered scrub and open mosaic habitat immediately adjacent to the mouth of the River Tees and Seal Sands Bay. Wetland bird counts to date have detected larger (albeit still small) numbers of birds in these areas, including occasional gull roosts and the presence of feeding and roosting waders including curlew (*Numenius arquata*) and oystercatcher (*Haematopus ostralegus*) in small numbers. Larger numbers of water birds, predominantly waders and ducks for which Teesmouth and Cleveland Coast Ramsar, SPA and SSSI are designated, were recorded within adjacent intertidal habitats.
- 6.7.11 However, overall the baseline conditions as outlined above apply and are relevant to both Main Site A and Main Site B.
- Scope of the Assessment
- 6.7.12 The Proposed Development Site is located predominantly onshore (i.e., within terrestrial habitats). However, some elements of the Proposed Development are proposed beneath, through or within estuarine and wetland habitats including intertidal habitat, tidal saltmarshes and land-locked non-tidal wetlands, plus adjacent terrestrial non-wetland habitats that may support foraging or roosting water birds.
- 6.7.13 Further baseline data will be gathered as per the methods and within the areas summarised in Table 6-3 to 6-4, including further surveys as outlined. This includes all of the habitats surveyed previously, plus a wider area that includes more habitat
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to the north-west, west and south of the Proposed Development Site, including the North Tees Marshes.

- 6.7.14 The ornithology chapter will assess the potential impacts and effects on relevant bird designations and bird species (hereafter 'relevant bird features') as a result of the Proposed Development. The methodology will be the same as that described in Section 6.6: Ecology and Nature Conservation.

The potential impacts of the Proposed Development on relevant bird features will include those arising from construction and operation. The following potential impacts and effects will be considered in the ornithology chapter:

- the effects on birds resulting from temporary impacts to and degradation of habitats within the Proposed Development Site during construction, including impacts from sediment run-off to surface waters;
 - temporary disturbance of birds, principally through noise, visual, and dust emissions from construction traffic and other construction related activities;
 - permanent losses or degradation of habitats used by nesting, roosting, and feeding birds during construction of new infrastructure;
 - disturbance of habitats and protected species (including noise and light impacts) in the vicinity of the Proposed Development during operation; and
 - long-term air quality impacts on designated habitats of importance for relevant birds in the vicinity of the Proposed Development Site during operation.
- 6.7.15 These potential impacts on relevant bird features will be assessed in accordance with the current good practice methodology for EclA described in Section 6.6: Ecology and Nature Conservation.
- 6.7.16 The results of the ornithological desk study, further bird surveys, and outcomes of any consultation responses will be used to inform the EclA. The assessment will also be informed by the findings of the other specialist assessments, such as those to be reported in the chapters for Noise, Air Quality, Surface Water, Flood Risk and Water Resources, Terrestrial Ecology and Marine Ecology. The findings of the HRA will also be considered.
- 6.7.17 Design and impact avoidance measures will be used to inform the assessment of likely significant effects. These measures will be defined later but for ornithology this is likely to include (but is not necessarily limited to) the following measures:
- consideration of routing of proposed connection corridors to utilise existing above ground and/or underground infrastructure to limit the excavations and construction activities required and therefore habitat losses and disturbance to species and habitats;
 - routing of proposed connection corridors, where these require new infrastructure, to avoid sensitive habitats and areas of regular bird occurrence such that the potential impacts on relevant ornithological receptors are avoided or reduced to levels that are not significant;

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- implementing measures to deliver compliance with industry good practice and environmental protection legislation during construction, e.g., prevention of surface and ground water pollution, fugitive dust management, and noise prevention or amelioration. These would be implemented through the CEMP or permitting regimes; and
 - planning clearance of habitats suitable for breeding birds during site preparation to be undertaken outside the breeding season (typically March-August inclusive for most species), where possible.
- 6.7.18 Once design and impact avoidance measures have been taken into consideration any remaining significant adverse effects will be mitigated or compensated for, and ecological enhancements recommended where appropriate. Mitigation and enhancement proposals will consider wider strategic aims and options for mitigation of development in the Teesside / Redcar and Cleveland and Hartlepool areas. Following the implementation of mitigation and compensation, any residual effects on ecological receptors will be identified.
- 6.7.19 The scope of assessment set out above would be applied whether Main Site A or B (and their respective connection corridors) are taken forward to the final development design.
- 6.8 Marine Ecology
- Baseline Conditions
- 6.8.1 The Study Area for marine ecology has a particular focus on Greatham Creek, Seaton Channel and Seal Sands as well as the Tees Estuary further downstream. Although no works are proposed within the Tees Bay area, further consideration has been given to the North Sea (including Tees Bay) for receptors with larger extents and / or greater mobility, such as fish and shellfish and marine mammals. A summary of the marine ecology baseline conditions within the Study Area is provided below. Note that the Study Area used is defined as including the likely Zol where potential significant effects may arise from the Proposed Development. The Zol, and therefore also the Study Area, is specific to each receptor, recognising both the mobility of each receptor and the likely impact pathways.
- Benthic Ecology**
- 6.8.2 The Study Area consists of extensive intertidal and subtidal estuarine soft sediment. Habitat mapping undertaken by the JNCC (2019) and the Environment Agency (2022c) identified Greatham Creek to consist of littoral mud (EU Nature Information System (EUNIS) A2.3), with saltmarsh habitat (EUNIS A2.5) embanking the creek. These habitats were also recorded at Seal Sands, including patches of littoral sand and muddy sand (EUNIS A5.2) and a small area of eulittoral boulders and stable mixed substrata (EUNIS A1.323). The seabed at Seaton Channel and in the River Tees consisted of estuarine sublittoral mud (EUNIS A5.32). Habitats with higher contents of sand, such as infralittoral fine sand (EUNIS A5.23), infralittoral muddy sand (EUNIS A5.24), and littoral mobile/fine sand shores (EUNIS A2.22 / A2.23) occur at the mouth
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of the river and in Tees Bay. Small patches of mussel and subtidal kelp beds have been recorded at South Gare Breakwater, including at the mouth of the estuary.

Fish and Shellfish

- 6.8.3 The River Tees and Estuary is an important water body for diadromous fish species which make seasonal migrations between the sea and riverine environment. Atlantic salmon (*Salmo salar*), sea trout (*Trutta trutta*), European eel (*Anguilla anguilla*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) are all known to be present and have been identified as Local Priority Species within the Tees Valley Biodiversity Action Plan (BAP), now listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. The River Tees is also considered a main salmon river in England and Wales (Centre for Environment, Fisheries and Aquaculture Science (Cefas) *et al.*, 2022). It has been presumed at this stage that these species may also use Greatham Creek, although there are no data to support this (such as on the Environment Agency (2022d) ecology and fish data explorer).
- 6.8.4 Estuarine and marine fish communities within the lower reaches of the River Tees and coastal waters represent a mixed demersal and pelagic fish assemblage typical of the central North Sea. Species such as sprat (*Sprattus sprattus*), herring (*Clupea harengus*), plaice (*Pleuronectes platessa*) are most prevalent, as are lesser sand eel (*Ammodytes tobianus*) in Tees Bay. Fisheries sensitivity maps (Coull *et al.*, 1998; Ellis *et al.*, 2012) indicate that the Study Area is located within the nursery grounds of the following species: herring, sprat, cod (*Gadus morhua*), whiting (*Merlangius merlangus*), plaice, Nephrops sp., lemon sole (*Microstomus kitt*) and spurdog (*Squalus acanthias*). The Proposed Development Site also includes spawning areas of lemon sole and Nephrops. These spawning and nursery grounds are considered to be present mostly in the surrounding coastal areas, although some species may occur in the estuary.
- ### Marine Mammals
- 6.8.5 The Proposed Development Site is located within the International Council for the Exploration of the Sea (ICES) Greater North Sea Ecoregion, which in part forms the boundaries for the Inter-Agency Marine Mammal Working Group (IAMMWG) marine mammal Management Units (MUs) for the North Sea (ICES, 2021; IAMMWG, 2022). Within this ecoregion, four species of cetacean occur commonly or are resident.
- 6.8.6 These are: harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), minke whale (*Baleanoptera acutorostrata*) and white-beaked dolphin (*Lagenorhynchus albirostris*). An additional five species occur regularly in the ecoregion but are less common: short-beaked common dolphin (*Delphinus delphis*), Atlantic white-sided dolphin (*Lagenorhynchus acutus*), long-finned pilot whale (*Globicephala melas*), killer whale (*Orcinus orca*), and Risso's dolphin (*Grampus griseus*). However, it is considered unlikely that these species will occur in the River Tees itself, although harbour porpoise could occur in the surrounding coastal waters, such as in Tees Bay.

6.8.7 The Study Area is an important area for harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*), falling within the North East England seal management unit (SMU)¹³ for both species (Special Committee on Seals (SCOS), 2021). Seal Sands is of particular importance as the intertidal mudflat hosts a breeding colony of harbour seals, supporting 100 – 140 harbour seals during the summer period (Bond, 2019). Harbour seals are also known to haul-out at Bailey Bridge and Greatham Creek. Grey seal are also present at Seal Sands, where up to 40 individuals may be hauled-out in the summer period (Bond, 2019).

Designated Sites

6.8.8 As outlined in Section 6.6: Ecology and Nature Conservation, the Proposed Development Site is situated within close proximity to statutory designated sites for nature conservation including (but not limited to) the Teesmouth and Cleveland Coast SPA, Ramsar site and SSSI, and the Teesmouth NNR.

6.8.9 These sites are designated for the protection of breeding and non-breeding bird species and other important waterfowl species which includes a range of coastal habitats (sandflats and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes) within and around the Tees Estuary, Seal Sands, and Greatham Creek.

6.8.10 The Teesmouth and Cleveland Coast SSSI encompasses a number of previously designated SSSI sites, including the Seal Sands SSSI, which protects the breeding population of harbour seal (*Phoca vitulina*) at this location (as does the Teesmouth NNR).

6.8.11 The Study Area does not overlap with any other European Sites or MCZs designated for marine species and habitats. The Southern North Sea (SNS) SAC, which is designated for harbour porpoise, is located over 100km away from the Proposed Development Site. The SNS SAC has been scoped out from further assessment, as there is considered to be no pathway for effect to this designated site.

Marine Specific Ecological Surveys and Data Collection

6.8.12 Following a review of available data, no project specific marine ecology surveys are proposed.

6.8.13 The presence of harbour and grey seals in the Study Area is well known, including abundances, seasonality, and the known haul-out locations for these species. Therefore, no effort-based surveys for marine mammals have been proposed. However, incidental sightings of seals at Seal Sands and Greatham Creek will be recorded as part of the breeding and non-breeding bird surveys proposed for the Proposed Development and will continue to be observed and recorded. This includes

¹³ The SCOS SMUs have been used in preference to OSPAR Regions, as the SMUs are based on expert knowledge and opinion of seal ecology in the UK, using the most pragmatic approach to management of seals, without inferring discrete populations (SCOS, 2021).

information on the species, their location, abundance, the presence of pups, and if seals are moulting.

6.8.14 Benthic ecology within the Study Area is well understood, through existing surveys undertaken by the JNCC (2019) and the Environment Agency (2022c), and the subtidal and intertidal benthic surveys completed for the NZT Project in the River Tees and Tees Bay. Open trench construction methodologies in the marine environment are not proposed within the Hydrogen Pipeline Corridor at Greatham Creek. Instead marine crossings will use trenchless technologies or existing pipeline bridges. These methods would result in the avoidance of most impact pathways to benthic habitats and species and would negate the requirement for further surveys. This will continue to be reviewed as the design progresses and following any input or requirements from statutory consultees such as Natural England and the MMO.

6.8.15 Key data sources used for the assessment will include, but not be limited to:

- habitat mapping undertaken by the JNCC (2019) – Marine Nature Conservation Review (MNCR) area summaries and the Environment Agency (2022c) – saltmarsh zonation and extent in England;
- European Marine Observation Data Network (EMODnet, 2021) Seabed Habitats Project for broad-scale habitat maps of the Study Area;
- EUNIS (European Environment Agency, 2012) for classifying benthic habitats;
- Environment Agency (2022d) ecology and fish data explorer, including Transitional and Coastal (TraC) Fish Count data;
- spawning and nursery grounds for UK waters (Coull *et al.*, 1998; Ellis *et al.*, 2012);
- Salmon Stocks and Fisheries in England and Wales (Cefas, 2022);
- Salmonid and fisheries statistics for England and Wales (Environment Agency, 2022e);
- fish landings data for the period 2016-2020 (MMO, 2020);
- ICES publications and data (ICES, 2022);
- shellfish classification zones of England and Wales (Cefas, 2022);
- SCANS (Small Cetacean Abundance in the European Atlantic and North Sea) data (Hammond *et al.*, 2021);
- IAMMWWG publications (IAMMWWG, 2022);
- Sea Mammal Research Unit (SMRU) (<http://www.smru.st-andrews.ac.uk/>) and Special Committee on Seals (SCOS) (2021);
- Habitat-based predictions of at-sea distributions for grey and harbour seals in the British Isles (Carter *et al.*, 2020);
- INCA Tees Seals Research Programme publications (Bond, 2019);
- academic papers and online reports as available for Study Area;

- designated sites condition assessments as available; and
- existing reference baseline data (where available and relevant) from other developments in the area (e.g. NZT Project will be used as background information).

6.8.16 There are no substantive differences in the baseline conditions between Main Site A and Main Site B and their respective connection corridors, with the exception that Main Site B is located closer to the Tees Estuary and Tees Mouth. Therefore, the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

6.8.17 During the construction of the Proposed Development there may be the requirement activities that would occur below MHWS, in the marine environment. At this stage, there are various construction methodologies being considered by the Applicant, but these may include the following below MHWS:

- a crossing under of the River Tees for the proposed Hydrogen Pipeline Corridor; and
- a potential crossing of Greatham Creek for the proposed Hydrogen Pipeline Corridor (which connects further upstream to Claxton Beck) at multiple locations (including close to Seaton on Tees Channel Delta and Seal Sands), to the north-west of the Proposed Development Site.

6.8.18 Main Site A is located approximately 1 km east of the River Tees and approximately 0.7 km south of the North Sea (Tees Bay). Although the Proposed Development Site is above MHWS, it still has the potential to have effects on marine ecology and has been considered further below. Main Site B is located approximately 0.1 km east of the River Tees, and approximately 1.1 km south of the North Sea.

6.8.19 As outlined in Section 3.5: Hydrogen Pipeline, feasibility and design work on routeing options, and construction methodologies to be used within the Hydrogen Pipeline Corridor is ongoing. Currently it is proposed that the crossing under the River Tees would be constructed using either an existing pipeline/tunnel or by HDD or a MBT, thereby minimising disturbance during construction. The effects of noise and vibration on marine ecological receptors as a result of construction at this location has therefore been scoped out in.

6.8.20 For other sections of the Hydrogen Pipeline Corridor where it crosses Greatham Creek, various construction methodologies are being considered, including the use of the existing pipeline bridge close to Seal Sands, and below ground trenchless technologies (i.e., using HDD or a MBT). However, open-cut trenching is not being considered for the crossing of the Greatham Creek.

6.8.21 Given that many design elements of the Proposed Development have yet to be confirmed, development design and impact avoidance measures have not been finalised at this stage. Appropriate measures will be discussed with statutory consultees and stakeholders as the DCO progresses, including in particular with the MMO.

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- 6.8.22 The Marine Ecology PEI and ES chapters will be completed in accordance with the CIEEM Guidelines for Ecological Impact Assessment (EclA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2022). The method will be tailored to reflect the specific conditions of the marine environment, to ensure the high levels of movement of marine receptors between habitats and populations, are considered fully.
- 6.8.23 Permanent removal of habitat in the intertidal is not currently proposed. However, if this approach changes, consideration will be given to the requirements of the Environment Act 2021. This will include a BNG assessment which will be undertaken for the Proposed Development in accordance with the published Natural England Biodiversity Metric 3.1 (Panks *et al.*, 2022).
- 6.8.24 The marine ecology assessment will consider the construction, operation, and decommissioning of the Proposed Development. At this stage, there is not considered to be a pathway for effects to marine ecology as part of the operational phase of the Proposed Development, whilst effects during the decommissioning phase are considered to be the same (or less) than those during construction.

The below potential impact pathways and their resulting effects on marine ecological receptors will be considered in relation to the Proposed Development.

Direct Loss and Physical Disturbance to Habitats and Species Under the Footprint of the Marine Construction Works

- Open cut trenching within the Hydrogen Pipeline Corridor with crossings at Greatham Creek is not proposed as it could result in the temporary loss of benthic habitats and species at these locations.
- The use of trenchless technologies (i.e., HDD and MBT) and existing pipeline bridges, would result in the avoidance of this impact pathway. Non-intrusive crossings also involve excavations each side of riverbanks. However, these would be set back from the channel far enough that construction works could not cause bank instabilities and effects to nearby marine habitats and species as an embedded mitigation measure.

Physical Disturbance to Benthic Habitats and Species from Increased Suspended Sediment Concentrations (i.e. Increased Turbidity and Deposition)

- Open cut trenching at Greatham Creek is not proposed as it could result in the mobilisation of fine sediment at this location, which could be transported and deposited on habitats further downstream, such as saltmarsh and intertidal mudflats surrounding the embankments of the creek and at Seal Sands.
- Furthermore, sediment bound contaminants may also be released, although concentration of contaminants in the sediment at these locations is unknown.
- The use of trenchless technologies (i.e. HDD and MBT) and the existing pipeline bridge, would result in the avoidance of this impact pathway.

Indirect Effects to Marine Ecology from Changes in Marine Water Quality (Excluding Turbidity)

- Pollution of the River Tees and surrounding watercourses could occur due to spillages or polluted surface water run-off from construction activities as part of the Proposed Development (if an appropriate Environmental Management Plan is not adhered to and materials are not appropriately stored). These discharges have the potential to alter water quality in terms of physico-chemical, biological and chemical parameters with indirect effects to marine ecology.

Changes in the Airborne Soundscape and Visual Disturbance During Construction

- 6.8.25 Marine and land-based construction activities associated with the Proposed Development will create airborne sound and changes in visual cues which has the potential to disturb seals that have surfaced or have hauled out. This is particularly true of any works close to Seal Sands and Greatham Creek, where seals are known to occur.
- 6.8.26 It is likely that measures can be implemented either within the design of the Proposed Development or as additional mitigation to ensure no residual significant effects however as this will need to be assessed further within the noise and marine assessments and is scoped into the assessment at this stage.
- 6.8.27 Underwater sound has been scoped out from further assessment, on the basis of that the use of vessels has not been proposed; drilling / piling in the marine environment is not likely to be required; and Unexploded Ordnance (UXO) clearance is considered unlikely. There is also considered to be no pathway for effect for INNS.
- 6.8.28 The results of a full review of the available baseline data, and outcomes of any consultation responses will be used to inform the marine ecology assessment. Once the marine baseline for the Proposed Development has been fully described, any relevant marine ecology receptors that are likely to be significantly impacted by the Proposed Development will be identified.
- 6.8.29 Once design and impact avoidance measures have been taken into consideration any remaining significant adverse effects will be mitigated or compensated for and ecological enhancements recommended where appropriate. Following the implementation of mitigation and compensation, any residual effects on ecological receptors will be identified.
- 6.8.30 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.9 Traffic and Transportation

Baseline Conditions

- 6.9.1 The main route to the Proposed Development Site will be via the existing access/industrial roads from the A1085 trunk road, with access onto the wider local network and the A19 via the A66, A1053 and A174.
- 6.9.2 There are no PRoWs within Main Site A or B. The Teesdale Way long distance route runs adjacent to the northern boundary of the Main Site A and approximately 0.4 km north east of Main Site B.

6.9.3 There are 16 PRoWs within the Proposed Development Site, namely:

- bridleway 116/10/2, which runs along the eastern boundary of the Wilton International site, in Kirkleatham;
- footpaths 102/2A/1, 102/2A/2, 116/31/1, 116/31/2 and 116/31/3, which run adjacent to the Teesport Estate and Tees Dock Road;
- footpaths 102/2/1, 102/2/2 and 102/2/3 and bridleways 116/9/1 and 116/9/2, which are located to the south of the above footpaths and the Teesport Estate, and form part of the Teesdale Way long distance footpath and the England Coastal Path (Filey Brigg to Newport Bridge);
- footpath 31, which connects Cowpen Lane and Seal Sands Link Road;
- an unnamed footpath, which runs along the railway line north of Claxton Beck, north-east of Cowpen Bewley Woodland Park; and
- three unnamed footpaths, which run north-east from Tees Road to Marsh House Lane; part of the southernmost of these is part of the England Coastal path (Newport Bridge to North Gare).

6.9.4 These PRoWs may be affected by the final routes of the hydrogen pipelines and other connections.

6.9.5 In addition to the above, byway 30 is adjacent to the Proposed Development Site, north of Wolviston Back Lane. Bridleway 102/194/2 is adjacent to the Proposed Development Site in Grangetown.

6.9.6 Footpaths 116/1/1, 116/1/2, 116/2/1, 116/37/1, 116/38/1 and 116/39/1 and bridleways 116/32/1, 116/33/1 and 116/36/1 are also located to the north-east of the Proposed Development Site, in Warrenby and Coatham. Bridleways 116/32/1 and 116/36/1 are the closest of this group to the Proposed Development Site; at closest point (where they connect to the Teesdale Way long distance route), they are located approximately 310 m north-east of the Proposed Development Site. Bridleways 116/32/1 and 116/33/1 are part of the England Coastal Path (Filey Brigg to Newport Bridge).

6.9.7 Whilst some of the Proposed Development Site is located within access land in the England Coastal Margin defined by the CRoW Act (2000), public access for industrial areas in South Tees is currently restricted under the CRoW act on the grounds of public safety until 21st July 2027 (Case Number 20140873571) after which date the restriction will be reviewed.

6.9.8 Some of the options for the hydrogen pipeline routing cross the Tees Valley Railway Line. Consultation will be undertaken with Network Rail and Northern Rail (and other rail operators as appropriate) regarding the potential crossings of rail lines required.

6.9.9 There are no substantive differences in the baseline conditions between Main Site A and Main Site B, therefore the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

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- 6.9.10 The following potential impacts may be associated with the Proposed Development:
- generation of traffic during construction (and decommissioning) affecting the local and strategic road network; and
 - construction of connections outside of the Main Site, affecting road and rail links and PRowS.
- 6.9.11 During the operational phase of the Proposed Development, it is anticipated that there will be a maximum workforce of up to 85 staff that will be required on a shift basis to be spread over a 24-hour period. Staff will travel to and from work in a variety of directions.
- 6.9.12 Natural gas will be delivered by pipeline and other operational and maintenance consumables will be managed to be kept as low as is reasonably practicable.
- 6.9.13 Therefore, it is anticipated that that the effects of operational traffic would be considerably lower than those generated during the construction phase.
- 6.9.14 Based upon the numbers of operational staff given above, it is proposed to scope out a detailed environmental assessment of this phase, in consultation with the relevant highway authorities.
- 6.9.15 The principal vehicle movements are anticipated to be associated with the construction phase of the Proposed Development.
- 6.9.16 The volume of construction vehicles associated with the delivery of plant and the labour force has not been fully determined at this stage, but as a worst-case scenario at this stage peak construction staff numbers are likely to be approximately 3,100 for both Phases 1 and 2.
- 6.9.17 This would equate to approximately 2,661 two-way vehicle movements per day during the peak construction period, based upon an average car occupancy for workers of 2.33 which is consistent with other developments in the local area. This peak is expected to last for approximately four months, between August 2025 and November 2025, assuming a July 2024 start date.
- 6.9.18 In terms of construction HGV and LGV movements there are predicted to be approximately 15,230 deliveries to the Main Site over the full period of construction, with 435 in the overall peak month of construction, November 2025, which then equates to approximately 40 two-way HGV movements per day, assuming a Monday to Friday working week.
- 6.9.19 There would also be approximately 4,333 HGV movements associated with the construction of the H₂ pipeline over the full period of construction, which would equate to a total of 542 in the peak month of November 2025, (approximately 50 two-way HGV movements per day).
- 6.9.20 To fully address the impacts of the construction phase on the transport network, a TA will be produced (though this will be confirmed following determination of the number of construction movements, in liaison with RCBC, as the highways authority, and National Highways). The scope for the TA will follow the guidelines set out in
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the PPG for 'Travel Plans, Transport Assessments and Statements' (DCLG, 2014). RCBC and National Highways will be consulted so that their specific requirements can be accommodated within the TA scope.

6.9.21 The traffic and transport chapter will summarise the salient points from the TA. It will also relate the magnitude and significance of potential impacts to criteria contained in the Institute of Environmental Assessment (IEA) (1993) 'Guidelines for the Environmental Assessment of Road Traffic' and the DMRB Volume 11 'Environmental Assessment' (National Highways, 2022).

6.9.22 The scope of the TA will cover the following key areas:

- a review of national, regional and local transport policy including the relevant aspects of the documents identified in Section 5: Planning Policy and Need;
- a description of baseline and future baseline conditions, including link and junction flows (described further below), a review of highway safety issues including examination of personal injury accident data and consideration of accessibility by all main transport modes;
- calculation of construction traffic flows over the period of construction;
- distribution and assignment of construction traffic flows to the road network, including the identification of routes for any abnormal loads required;
- local network impact analysis – the size of the study area is to be confirmed with the local authorities and Highways England, and key junctions may be identified by these stakeholders that require detailed capacity analysis;
- consideration of the local PRoW network for leisure and commuting uses, and whether their use would be affected by the Proposed Development;
- construction of H₂, gas, water and electrical connections where these affect road and rail links;
- cumulative impact assessment; and
- the formulation of mitigation measures (where required), such as a Construction Worker Travel Plan (CWTP) to promote sustainable journeys during the construction phase of the development and where possible reduce single occupant car journeys, and a Construction Traffic Management Plan (CTMP) to seek to control the routing and impact that HGVs will have on the local road network during construction.

6.9.23 Consultation with RCBC and National Highways will identify the key junctions to be included within the assessment for which junction counts and/ or existing data will be required that may be supplemented by link counts along the identified preferred routes to site. The data will be used to quantify baseline vehicular demand along key routes to and from the Proposed Development and will also form the basis of calculations to quantify the impact of construction traffic on the surrounding road network.

6.9.24 As described earlier, it is considered that traffic and transport impacts are more likely to occur during the construction phase of the Proposed Development and therefore an operational assessment is not proposed. A summary of any residual and cumulative impacts will be provided should the proposed mitigation not fully address the impact of the development on the transport network.

6.9.25 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.10 Landscape and Visual Amenity

Baseline Conditions

6.10.1 The Tees Lowlands NCA forms a 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.

6.10.2 Ecological European designated sites as outlined in Section 6.6: Ecology and Nature Conservation are in close proximity to heavy industry, which has developed due to the estuary's strategic location close to mineral reserves, a network of main roads, railways and Teesport. The existing industrial installations form a dramatic skyline when viewed from the surrounding hills.

6.10.3 There are no Landscape Character Designations covering the industrial complexes along the banks of the River Tees, including the Proposed Development Site and the surrounding area. However, the RCBC 'Landscape Character Supplementary Planning Document' (March 2010) notes that this industry has a strong influence on neighbouring landscape character areas.

6.10.4 Covering much of the open land north and east of the Proposed Development Site, the South Gare and Coatham Sands are classified as a sensitive landscape "*...which much landscape structure is present to give high 'strength of character' which is sensitive to change.*" Areas of the South Gare and Coatham Sands designation west and south-west of the Proposed Development Site are not included within this sensitive landscape classification.

The Proposed Development Site and its Setting (Landscape)

6.10.5 The Proposed Development Site and surrounding area are heavily influenced by large industrial structures and complexes as well as the residential settlements outlined in Section 2: Description of the Existing Environment. The industrial complexes within the Teesside industrial areas are heavily lit, which increases the areas visibility during the hours of darkness. The surrounding landscape contains localised tranquil areas including along the coast, River Tees and inland nature reserves, although the large-scale structures are ever present within views.

Representative Sensitive Receptors (Visual)

6.10.6 Viewpoints, chosen to represent a typical range of views of the Proposed Development, will be agreed with relevant stakeholders such as PINS, the relevant

LPAs, Natural England, the Forestry Commission and local residents. The viewpoints will be chosen to include appropriate receptor types, likely to include:

- residential receptors and PRow users;
- recreational uses; and
- road users.

6.10.7 There are no substantive differences in the baseline conditions between Main Site A and Main Site B, therefore the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

6.10.8 The following potential impacts may be associated with the Proposed Development:

- temporary changes to landscape character and views from sensitive receptors in the vicinity of the Proposed Development Site during construction and decommissioning; and
- permanent changes to landscape character and views from sensitive receptors in the vicinity of the Proposed Development Site during operation.

6.10.9 The proposed method of landscape and visual impact assessment has been devised to address the specific impacts likely to result from a development of its scale and nature. The methodology draws upon the following established best practice guidance:

- 'Guidelines for Landscape and Visual Impact Assessment' third edition (GLVIA3) (Landscape Institute and Institute for Environmental Management and Assessment (IEMA), 2013);
- 'Photography and photomontage in landscape and visual impact assessment' (Landscape Institute, Advice Note 01/11, 2011);
- Assessing landscape value outside national designations, Technical Guidance Note 02/21 (Landscape Institute, 2021); and
- Infrastructure, Technical Guidance Note 04/2020 (Landscape Institute, 2020).

6.10.10 The EIA process requires that a clear distinction is drawn between landscape and visual impacts, as follows:

- landscape impacts relate to the degree of change to physical characteristics or components of the landscape, which together form the character of that landscape, e.g. landform, vegetation and buildings; and
- visual impacts relate to the degree of change to an individual receptor's view of that landscape, e.g. local residents, users of public footpaths or motorists passing through the area.

6.10.11 An assessment of impacts on built heritage, including impacts on the setting of listed buildings and structures, will be included in the cultural heritage assessment as outlined in Section 6.11: Cultural Heritage.

6.10.12 A detailed study of the existing landscape components, character and views of the Proposed Development Site and an identified study area, developed following consideration of the ZTV discussed below, will be carried out in consideration of the following:

- site context (including industrial heritage);
- topography;
- vegetation including green infrastructure;
- roads, PRowS and access;
- settlement and land-use;
- landscape character; and
- representative views.

6.10.13 This will be supported by and photographs as appropriate. The planning context with respect to landscape character and visual amenity will also be assessed, taking into account relevant European, national, regional and local planning policies. The baseline study will form the basis of the assessment of the predicted impacts of the Proposed Development.

6.10.14 Approximately 12 representative views will be identified within the Zone of Theoretical Visibility (ZTV) for the main building envelope and the potential stacks and taller columns, as well as any structures required for the connections. The ZTV will be generated using a bare ground Digital Terrain Model (DTM) and be reviewed in the field against the following criteria in order to determine the selection of representative views which form the basis of the visual assessment:

- receptor function/activity;
- distance from the Proposed Development Site;
- topography and elevation;
- degree and period of exposure;
- designation of the viewing place; and
- distribution of receptors.

6.10.15 It is anticipated sensitive visual receptors that will need to be considered will include receptors:

- to the north Seaton Carew, North Gare Sands, South Gare breakwater and the Headland at Hartlepool;
- to the east Redcar, Marske-by-the-Sea;
- to the south from Kirkleatham, New Marske, Wilton, Eston Nab, Old Lackenby; and
- to the east from Cowpen Bewley Park and Billingham.

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- 6.10.16 An initial site visit will be undertaken together with a review of the full landscape and visual planning policy context in the vicinity of the Proposed Development Site. Using the Rochdale Envelope approach the assessment will be based upon the largest possible dimensions (maximum parameters) for the Proposed Development. Technical details regarding the height of the tallest elements of the Proposed Development will then enable the definition of the Study Area within which landscape or visual impacts have the potential to be significant. At this stage, it is considered unlikely that the tallest element (the flare) will be higher than 100 m above ground level, however, any assumptions made in relation to the parameters defined for the purposes of the assessment will be clearly outlined.
- 6.10.17 Visual Representations of the Proposed Development for agreed representative views (visual receptors) will be produced in line with the guidance within the Landscape Institute Advice Note 01/11. The location of representative views and photomontages will be agreed in consultation with RCBC, STBC, HBC and other key stakeholders.
- 6.10.18 A full explanation of the criteria used to assess sensitivity, magnitude of impact and classification of landscape and visual effects will be outlined within the ES.
- 6.10.19 The impact of night-time light pollution will be considered however and given the existing high levels of lighting in the area, being industrial in nature, it is considered unlikely for significant effects on sensitive receptors there this has been scoped out of the assessment. As outlined in Section 3.16: Lighting, an Indicative Lighting Strategy will be prepared and submitted with the Application. This will be referred to as required within the LVIA chapter of the ES.
- 6.10.20 Where the assessment indicates the need for mitigation as a result of significant effects on landscape character or visual amenity, these will be outlined within the ES.
- 6.10.21 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.
- 6.11 Cultural Heritage
- Baseline Conditions
- 6.11.1 There are no designated heritage assets within the Proposed Development Site.
- 6.11.2 There are 505 listed buildings within 5 km of the Proposed Development Site. The closest are:
- Village Farmhouse, Little Neuk Farm Cottage, Nightingale's Farmhouse and Barn and Hall's Farmhouse, all Grade II listed and located in Cowpen Bewley, approximately 70 m south of the Proposed Development Site;
 - Grade II* 'Phosphate rock silo number 15 at ICI works, Billingham', located approximately 100 m south of the Proposed Development Site; and
 - three Grade II listed buildings (Marsh Farmhouse and Farm Cottage, 'Garden Wall South of Marsh Farmhouse', and 'Barn and Stable Circa 10 Metres North West of
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Marsh Farmhouse'), located approximately 0.2 km north-east of the Proposed Development Site in Warrenby.

- 6.11.3 There are 22 Conservation Areas within 5 km of the Proposed Development Site, the closest of which are Cowpen Bewley Conservation Area, part of which falls within the Proposed Development Site, Kirkleatham Conservation Area, located approximately 260 m east of the Proposed Development Site, and Greatham Conservation Area, located approximately 550 m north-east of the Proposed Development Site.
- 6.11.4 There are 25 scheduled monuments within 5 km of the Proposed Development Site, the closest of which are:
- Claxton medieval moated site, located approximately 2 km north-east of the Proposed Development Site;
 - Eston Nab hillfort, palisaded settlement and beacon (and approximately 20 Bronze Age barrows, relating to a prehistoric settlement and funerary landscape), are located on Eston Hills, approximately 2.4 km south of the Proposed Development Site; and
 - 'World War I early warning acoustic mirror 650m north west of Bridge Farm', located approximately 3 km east of the Proposed Development Site, in Redcar.
- 6.11.5 There are two registered parks and gardens within 5 km of the Proposed Development Site: Grade II Albert Park, Middlesborough, located approximately 2.7 km south-east of the Proposed Development Site, and Grade II* Ropner Park, Stockton-on-Tees, located approximately 4.7 km south-east of the Proposed Development Site.
- 6.11.6 There are no world heritage sites or registered battlefields within 5 km of the Proposed Development Site.
- 6.11.7 There are approximately 700 non-designated heritage assets within 1 km of the Proposed Development Site, including approximately 180 within 1 km of the Main Sites, comprising find spot evidence, sites of post-medieval and modern industrial structures that are no longer extant, former landscape features including ridge and furrow, and defensive structures dating from the First and Second World War. Several Second World War pillboxes are located to the immediate north of Main Site A, in the dunes between Main Site A and Coatham Sands.
- 6.11.8 Two assets recorded on the Historic Environment Record (HER) are located partially within the Main Sites, comprising the site of a jetty at South Gare and a spur of rail which linked Redcar Iron Works to the jetty. These assets are no longer extant but there is a potential for subsurface, foundation remains to be present, depending on the extent of ground disturbance at the Proposed Development Site. In addition, there may be extant features of industrial archaeological interest present within the Proposed Development Site.
- 6.11.9 There are no substantive differences in baseline conditions between Main Site A and Main Site B. Therefore, the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

- 6.11.10 The following impacts may occur as a result of the construction and operation of the Proposed Development:
- physical, permanent impacts to non-designated heritage assets within the Proposed Development Site and along the connections during construction;
 - temporary impacts to designated and non-designated heritage assets arising from changes to their setting during the construction of the Proposed Development; and
 - permanent impacts to designated and non-designated heritage assets arising from changes to the setting during the operational phase of the Proposed Development.
- 6.11.11 A cultural heritage DBA will be produced to determine, as far as is reasonably possible from existing records, the nature of the cultural heritage resource within a Study Area of 1 km for non-designated assets. This Study Area is sufficient for identifying heritage assets within the Proposed Development Site that may be physically impacted by the Proposed Development and for providing relevant context for the archaeological and historical baseline narrative.
- 6.11.12 An initial larger Study Area of 5 km will be used to capture designated heritage assets data. This larger Study Area will be used to identify potential impacts to heritage assets arising from changes to their setting due to visual or aural intrusion, which may arise as a result of the Proposed Development. The final extent of this larger Study Area will be informed and refined by site visits and setting assessments carried out by the heritage team and also by the ZTV produced for the LVIA as outlined in Section 6.10: Landscape and Visual Amenity and noise contour data (as applicable) produced for the Noise and Vibration assessment.
- 6.11.13 Data sources consulted during the production of the DBA will include but not be limited to:
- National Heritage List for England database (Historic England, 2022);
 - formal searches of the Redcar and Cleveland and Tees HER, including the Historic Landscape Characterisation data;
 - online resources including the BGS (2022) Geology of Britain Viewer; Defence of Britain database and the LPA portal for the Local Plan and other relevant planning information;
 - published and unpublished literature (including a detailed review of reports for previous fieldwork carried out within the proximity to the Proposed Development Site);
 - existing geotechnical data; and
 - documentary, cartographic and other resources as deposited within the local Archives and Local Studies Library.

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- 6.11.14 The DBA and ES will comply with relevant legislation, national and local planning policy, specifically the NPPF and relevant Local Plans, and in line with the relevant guidance, including:
- PPG, Conserving and enhancing the historic environment (MHCLG, 2019b);
 - Historic Environment Good Practice Advice in Planning Note 2. Managing Significance in Decision Taking in the Historic Environment. Historic England (Historic England, 2015);
 - Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets. Historic England (2nd edition) (Historic England, 2017);
 - Historic Environment Statement of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12. Historic England (Historic England, 2019);
 - Commercial Renewable Energy Development and the Historic Environment. Historic England Advice Note 15 (Historic England, 2021);
 - Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (CIfA, 2020);
 - CIfA Code of Conduct (CIfA, 2022); and
 - IEMA, the Institute of Historic Building Conservation (IHBC) and CIfA, Principles of Cultural Heritage Impact Assessment in the UK (IEMA, *et al.*, 2021).
- 6.11.15 Consultation with relevant heritage officers will be undertaken during the production of the DBA and the ES.
- 6.11.16 The assessment of potential effects will first determine the heritage significance (value) of heritage assets, which is defined in the NPPF (MHCLG, 2021) as deriving from its heritage interests which may be archaeological, architectural, artistic or historic (NPPF Annex 2, Glossary).
- 6.11.17 Once the value of each asset is defined, including the contribution its setting makes to its value, the level and degree of impact arising from the Proposed Development will be assessed taking into account any development design and impact avoidance measure (embedded mitigation). An assessment of the effects of the Proposed Development will then be determined and additional mitigation measures may be proposed where significant effects are predicted.
- 6.11.18 Given that construction methodologies such as HDD or MBT will be utilised during the construction of the hydrogen pipeline beneath the River Tees to minimise disturbance to sensitive receptors at this location, it is considered unlikely that the Proposed Development will result in direct impacts to marine cultural heritage assets. No construction works are proposed in areas below MHWS where there is the potential for marine cultural heritage receptors to be located and more highly concentrated (e.g. in the area of Tees Bay and the North Sea). It is considered unlikely that the construction/ operation of the Proposed Development would result in significant effects on Marine heritage assets and an assessment of impacts on Marine
-

Cultural Heritage (those assets below MHWS) is proposed to be scoped out of the EIA.

6.11.19 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.12 Socio Economics and Land-Use

Baseline Conditions

6.12.1 Baseline conditions are defined for the socio economics Study Area against England as a whole. Office for National Statistics (ONS) statistical geographies will be used to define the Study Area, including the Lower Layer Super Output Areas (LSOAs) and the Wider Impact Area (assumed to be the Travel to Work Area (TTWA)) that the Proposed Development Site falls into. The LSOAs that the Proposed Development Site lies within are within the boundaries of Redcar and Cleveland, Stockton-on-Tees and Hartlepool.

6.12.2 The local population and labour market are the main receptors in the assessment for employment effects. Understanding the baseline conditions enables the impact of employment generated by the Proposed Development on the local population and labour market to be determined. The impact is mostly influenced by the size of the labour market and whether it has the relevant skills, occupations and sector strengths.

6.12.3 The socio-economics baseline will include data for the following geographies, to compare statistical information for:

- H2Teesside Study Area;
- Middlesbrough and Stockton TTWA; and
- England.

6.12.4 The scoping baseline has been carried out using a number of recognised data sources including the following:

- Population Estimates (ONS, 2020)¹⁴;
- Census 2011 (ONS, 2012);
- Indices of Multiple Deprivation (MHCLG, 2019c); and

¹⁴ Includes the following Lower Layer Super Output Areas (LSOAs): E01012107: Redcar and Cleveland 003D, E01032560: Redcar and Cleveland 003E, E01032561: Redcar and Cleveland 003F, E01012114: Redcar and Cleveland 009B, E01012109: Redcar and Cleveland 011B, E01012198: Stockton-on-Tees 003B, E01012279: Stockton-on-Tees 004B. The selection of these LSOAs is based on a “best-fit” criteria to align to the Proposed Development Site. Other LSOAs including those from Hartlepool were reviewed, but they do not accurately represent the Proposed Development Site, and therefore have been excluded from this analysis.

- Business Register and Employment Survey (ONS, 2021).

6.12.5 The list above is intended to provide an outline of sources however, additional datasets may be utilised in the preparation of the assessment.

Population

6.12.6 The H2Teesside Study Area is located between two local authorities, Redcar and Cleveland and Stockton-on-Tees, in the North-East of England. The population of the H2Teesside Study Area was 10,000 in 2020, which accounted for approximately 2% of the Middlesbrough and Stockton TTWA (ONS, 2020). In the H2Teesside Study Area, 62% of the population are of working age¹⁵, which is in line with national averages and the TTWA. The proportion of elderly people (65+ years) in the H2Teesside Study Area (17%) is comparatively smaller than for the TTWA (20%), and nationally (19%), implying a smaller dependency ratio in the H2Teesside Study Area. This can be seen in Plate 6-1.

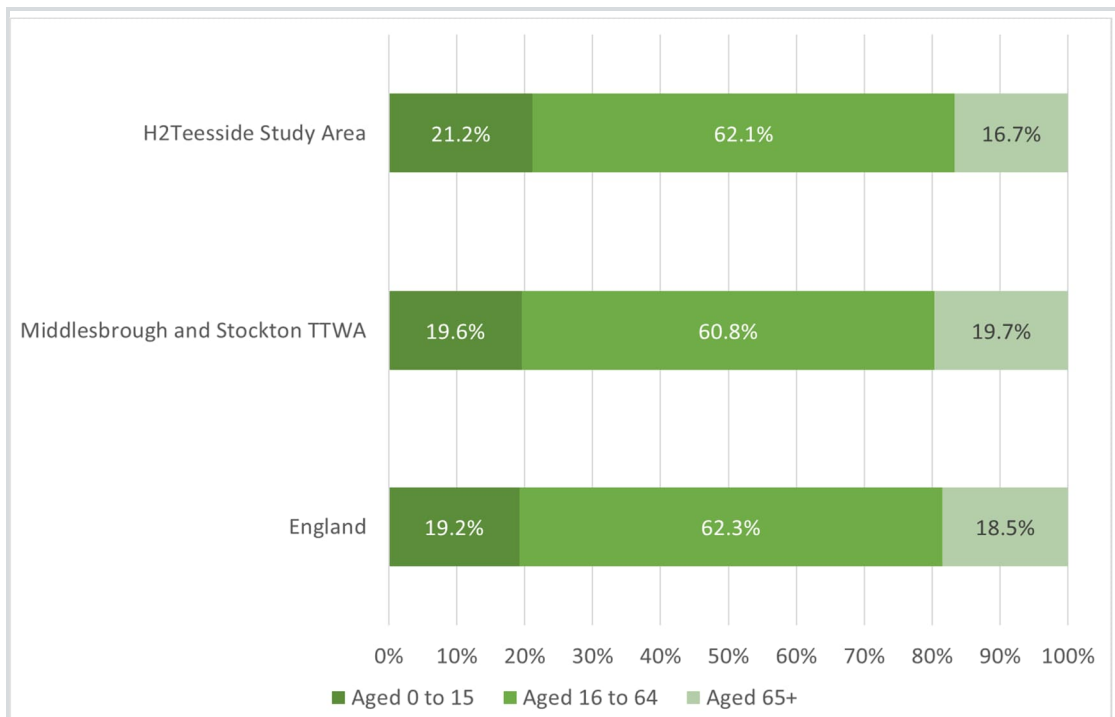


Plate 6-1: Population Age Breakdown (H2Teesside Study Area, Middlesbrough and Stockton Travel -To- Work Area, and England)

Source: Office for National Statistics Population Estimates, 2020.

Economic Activity Trends

¹⁵ Between 16 and 64 years of age.

6.12.7 Census 2011 data shows that in the H2Teesside Study Area, approximately 70% of the working age population are economically active, with the most common form of economic activity being full time employment (39%) (ONS, 2012). Rates of economic activity are higher in the H2Teesside Study Area than the TTWA area (66%) and nationally (65%). Of the economically active, approximately 4% are unemployed in the H2Teesside Study Area, compared to 6% for the TTWA and 9% nationally. Among the economically inactive in the H2Teesside Study Area, the most common reason is retirement.

Deprivation

6.12.8 Multiple sections of the H2Teesside Study Area lie in areas of relative deprivation. Of the seven LSOAs within the H2Teesside Study area, four are in the most deprived decile nationally (MHCLG, 2019c). More widely, areas of deprivation are prevalent in the local authorities in which the H2Teesside Study Area resides, as Redcar and Cleveland and Stockton-on-Tees are ranked the 40th and 73rd most deprived local authorities nationally.

Employment by Industry

6.12.9 In the H2Teesside Study Area, manufacturing (Sector C, 24% of total employment) is the largest industry; this percentage is considerably higher than the Middlesbrough and Stockton TTWA average (10%) and the national average (8%) (ONS, 2021). The second largest industry is transport and storage (Sector H, 18%), followed by business administration & support services (Sector N, 12%), both of which are higher percentages than the TTWA and national averages.

6.12.10 The employment percentages for the industries of mining, quarrying & utilities (Sectors B, D and E, 7%) and construction (Sector F, 7%) are comparatively higher for the Study Area than for the TTWA and national averages, whereas the percentages for retail (Sector G, 1%), education (Sector P, 3%) and health (Sector Q, 2.4%) for the Study Area are considerably lower than those for the TTWA and national averages. These trends can be seen in Plate 6-2.

Land Use

6.12.11 The Proposed Development Site is located within a largely urban area, consisting of existing and former sites of industrial installations north and south of the River Tees. The Main Sites are located on parts of the former Redcar Steelworks and the adjacent RBT Site. The connection corridors south of the River Tees are located within or in close proximity to the existing industrial area, generally following existing pipeline routes.

6.12.12 The connection corridors north of the River Tees also generally follow existing pipeline routes within existing industrial areas, but also extend into areas of open or agricultural land, north and west of the existing industrial area.

6.12.13 According to the Natural England Agricultural Land Classification (ALC) map for the North East Region (ALC001), part of the Proposed Development Site, near Kirkleatham, is located within Grade 2 'Very Good' agricultural land. ALC Grades 1 to 3 are classified as 'Best and Most Versatile' (BMV) land.

6.12.14 There are further areas of Grade 3 ‘Good to Moderate’ agricultural land (potentially BMV) within the north-west of the Proposed Development Site, in the vicinity of Greatham. The remainder of the Proposed Development Site is located within areas of Grade 4 ‘Poor’ or 5 ‘Very Poor’ agricultural land, non-agricultural land (‘land predominantly in urban use’ or ‘other land primarily in non-agricultural use’), and not BMV.

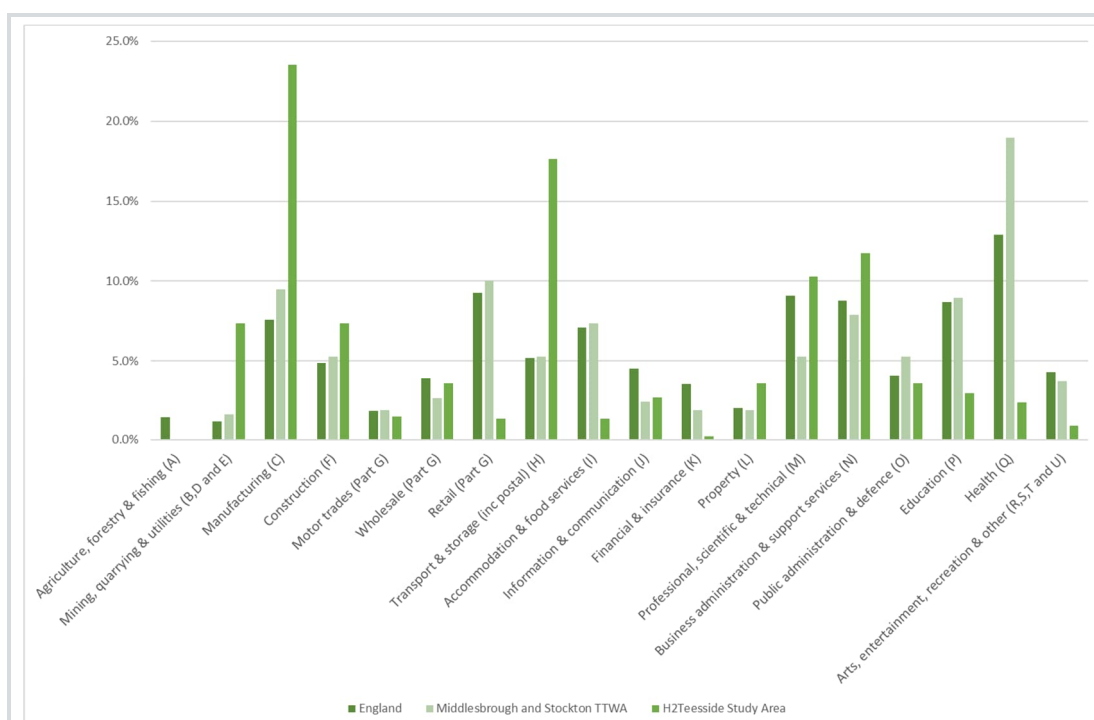


Plate 6-2: Employment by Industry (H2Teesside Study Area, Middlesbrough and Stockton Travel -To- Work Area, and England)

Source: Office for National Statistics Business Register and Employment Survey (BRES), 2020.

6.12.15 Given the locations of Mains Sites A and B, and that the connections corridor network for both is very similar, there are no substantive differences in the baseline conditions between them. Therefore, the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

6.12.16 The Proposed Development could have beneficial and adverse socio economic and land use effects that will need to be assessed. The approach to assessing the socio economics effects will be based on a proven and robust approach used for assessments of a similar nature. The assessment will be carried out using a number of recognised data sources.

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- 6.12.17 It will consider the Proposed Development against established national and local policy standards and best practice benchmarks. This will include socio-economic policy justification for the Proposed Development and the contribution of activities associated with the Proposed Development to the socio economic policy objectives of RCBC, Tees Valley Combined Authority and STDC.
- 6.12.18 The chapter will also include a baseline assessment reviewing existing data outlining the relevant local policy context and a description of the existing socio economic conditions in the local study area including demographic data, labour market indicators; skills and unemployment and the local economic structure.
- 6.12.19 The assessment will consider the potential direct, indirect and cumulative socio economics impacts for each phase of the Proposed Development (construction, operation and decommissioning). It will draw on other assessments included in the ES where necessary. Wherever possible, the impacts identified in the assessment will be appraised against relevant national standards such as those provided by HM Treasury and Homes England (formerly the Homes and Communities Agency (HCA). Where relevant standards do not exist, professional experience and expert judgement will be applied and justified.
- 6.12.20 Mitigation measures (some of which may have already been considered through the development of the proposals) will be considered and key indicators for monitoring socio-economic impacts will be established.
- 6.12.21 The anticipated potential effects during the construction, operation, and decommissioning phases could include the following:
- direct and indirect employment creation;
 - the potential for the promotion/provision of training and apprenticeship opportunities, upskilling locally unemployed and potential wider economic benefits;
 - temporary disruption to traffic on the local and strategic road networks;
 - temporary disruption to PRowS;
 - impacts on businesses either direct or indirect via in combination effects identified by other discipline assessments; and
 - any land use impacts (such as effects on planned developments).
- 6.12.22 Where the Proposed Development Site interacts with areas of Grade 2 (BMV) and Grade 3 (potential BMV) agricultural land, these are all located within the Hydrogen Pipeline Corridor. The land would be used for construction of pipelines (as a worst-case assumed below ground open trench) and after pipeline installation, the trench would be infilled, and the soil disturbed would be reinstated in-situ (replicating existing strata as necessary). It is considered that significant effects are not likely, with any land use effects relating to agricultural land temporary, and an assessment of impacts on Agricultural Land is not required. The remainder of the Proposed Development Site is comprised of existing or former industrial land.
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6.12.23 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.13 Climate Change

6.13.1 As outlined in Section 3.1: Overview, based on current projections (including Phase 1 and Phase 2 of the Proposed Development), H2Teesside would continuously export approximately 2.84 Mt/year (at 100% utilisation) of dehydrated and compressed CO₂.

6.13.2 It is considered that the Proposed Development would represent a significant step forward in the implementation of H₂ as a viable, low carbon fuel source for industrial, transport, and other applications that could make a significant contribution to reducing CO₂ emissions.

Baseline Conditions

6.13.3 The baseline conditions for the climate change chapter will be a business-as-usual scenario whereby the Proposed Development does not proceed, for those lifecycle stages scoped into the assessment.

6.13.4 For the GHG assessment the current and future baseline comprises existing carbon stock and sources of GHG emissions within the Proposed Development Site. It is recognised that there are a number of fuels and energy vectors that may plausibly be replaced by hydrogen. For information, whilst not part of the Proposed Development, the assessment can also consider the emissions that may potentially be avoided as a result of the Proposed Development, by the replacement of fossil fuels by the H₂ generated in the Proposed Development over its operational lifetime..

6.13.5 For the Climate Change Risk Assessment the current baseline is based on historic climate data obtained from the Met Office website (Met Office, 2023) recorded by the meteorological station closest to the Proposed Development (Stockton-on-Tees) for the period 1981-2010 indicates the following:

- average annual maximum daily temperature was 13.1 °C;
- warmest month on average was July (mean maximum daily temperature of 20.4 °C);
- coldest month on average was December (mean minimum daily temperature of 0.7 °C);
- average total annual rainfall levels were 574.19 mm;
- wettest month on average was August (60.62 mm of rainfall on average for the month); and
- driest month on average was February (32.9 mm of rainfall on average for the month).

6.13.6 The Future baseline assessment considers the RCP8.5 scenario of the UK Climate Projections 2018 (UKCP18; Met Office, 2018) for the 25 km² grid square within which the Proposed Development Site is located.

6.13.7 For the purpose of the assessment, UKCP18 probabilistic projections for the following average climate variables have been obtained and analysed:

- mean annual temperature;
- mean summer temperature;
- mean winter temperature;
- maximum summer temperature;
- minimum winter temperature;
- mean annual precipitation
- mean summer precipitation; and
- mean winter precipitation.

6.13.8 Projected temperature and precipitation variables are presented in Table 6-6 and Table 6-7 below. UKCP18 probabilistic projections have been analysed for the 25 km grid square where the Proposed Development is located. These figures are expressed as anomalies in relation to the 1981-2010 baseline.

6.13.9 As the design life of the Proposed Development may exceed the predicted lifespan of 25 years, the assessment has considered a high emissions scenario at the 10%, 50% and 90% probability levels to assess the impact of climate change up to 2100.

Table 6-6: Projected Changes to Temperature Variables 50th Percentile (RCP 8.5) (10th to 90th Percentile Presented in Parenthesis)

CLIMATE VARIABLE	TIME PERIOD		
	2020-2049	2040-2069	2070-2099
Mean annual air temperature anomaly at 1.5m (°C)	+1.0 (+0.4 to +1.6)	+1.3 (+0.6 to +2.1)	+2.1 (+1.0 to +3.2)
Mean summer air temperature anomaly at 1.5m (°C)	+1.0 (+0.2 to +1.8)	+1.3 (+0.3 to +2.3)	+2.4 (+0.7 to +4.2)
Mean winter air temperature anomaly at 1.5m (°C)	+1.0 (+0.0 to +1.9)	+1.3 (+0.1 to +2.5)	+1.9 (+0.5 to 3.5)
Maximum summer air temperature anomaly at 1.5m (°C)	+1.1 (+0.2 to +2.1)	+1.5 (+0.3 to +2.7)	+2.6 (+0.8 to +4.6)
Minimum winter air temperature anomaly at 1.5m (°C)	+1.0 (+0.0 to +2.0)	+1.3 (+0.2 to +2.4)	+1.9 (+0.5 to +3.3)

Table 6-7: Projected Changes to Precipitation Variable (%)

CLIMATE VARIBALE	TIME PERIOD		
	2020-2049	2040-2069	2080-2099

Annual precipitation rate anomaly (%)	+4.5 (-1.5 to +11.2)	+1.5 (-3.5 to +6.9)	+0.8 (-6.0 to +8.3)
Summer precipitation rate anomaly (%)	-2.0 (-16.8 to +14.7)	-5.1 (-19.9 to +11.3)	-16.4 (-36.6 to +5.5)
Winter precipitation rate anomaly (%)	+9.5 (-3.0 to +22.8)	+12.0 (-1.2 to +26.3)	+14.6 (-4.3 to +35.7)

6.13.10 There are no substantive differences in the baseline conditions between Main Site A and Main Site B. Therefore, the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

6.13.11 The GHG Study Area includes all GHG emissions from within the Proposed Development Site arising as a result of the Proposed Development during all phases.

6.13.12 The receptor for GHG emissions is the global climate as the effects are not geographically constrained, which means all development has the potential to result in a cumulative effect on GHG emissions. The UK's relevant five-year carbon budget will be used as a proxy for the global climate.

6.13.13 A discussion of the GHG emissions from the energy sector in the UK will be provided. The GHG emissions resulting from alternative energy sources and vectors, that could realistically be replaced by low carbon H₂ from the Proposed Development will be considered. These could include natural gas, diesel fuel for HGV transport, or coke used for steel production.

6.13.14 This section will draw on guidance including the GHG Protocol (World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), 2004), PAS2080 (BSI, 2016), and the updated IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022) such that it will provide discussion and, where relevant, assessment of:

- the scope of the assessment;
- baseline GHG emissions;
- alternative emissions (i.e., future baseline without the Proposed Development);
- net assessment of the direct emissions of the Proposed Development; and
- any mitigation (or other) CO₂ emissions savings throughout the operational life of the Proposed Development.

6.13.15 To align with the requirements of the EIA Regulations 2017 and associated published guidance, three separate aspects have been considered in scoping the climate assessment:

- Lifecycle GHG impact assessment: The effect on climate change of GHG emissions arising from the Proposed Development, including how the Proposed Development will affect the ability of UK Government to meet reduction targets

within its carbon budgets. The lifecycle GHG assessment will consider emissions from the following stages:

- Product stage: including from the manufacture and supply of the products and materials required to build the Proposed Development.
 - Construction stage: including from construction activities, transportation of workers and materials to the Proposed Development Site, and transportation and disposal of waste construction materials.
 - Operational stage: including from the consumption of energy and materials, supply of water and treatment of wastewater, and worker commuting during the operational phase. Emissions potentially avoided as a result of H₂ generated from the Proposed Development.
 - Decommissioning stage-including from on-site decommissioning activity, transportation and disposal of waste materials, and worker travel. Emissions from decommissioning are frequently subject to considerable uncertainty due to the timescales involved.
- In-combination climate change impact (ICCI) assessment: The combined impact of the Proposed Development and potential climate change on receptors in the receiving environment; and
 - Climate Change Resilience (CCR) assessment: The resilience of the Proposed Development to climate change impacts, including how the design takes into account projected impacts of CCR of the Proposed Development to impacts from projected climate change, using the RCP8.5 projections from UKCP18 as a worst-case scenario.

6.13.16 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.14 Major Accidents and Disasters

Baseline Conditions

6.14.1 The Study Area for assessment of Major Accidents and Disasters (MA&Ds) is not defined within regulatory guidance or standardised methodology, however it is likely that a Study Area of 5 km from the Proposed Development Site will be utilised.

6.14.2 For the purpose of EIA Scoping, a high-level review of installations in close proximity to the Proposed Development Site has been undertaken and an initial list is illustrated on Figure 14: Major Accidents and Disasters Receptors within 5 km of the Proposed Development Site Boundary (Appendix A). This area of Teesside includes installations regulated by the Control of Major Accident Hazard (COMAH) Regulations 2015 and major accident hazard pipelines regulated by the Pipelines Safety Regulations (PSR) 1996. The Study Area may be refined during later stages of

assessment, as information on the location and risks associated with particular hazards is developed.

6.14.3 The following data sources have been utilised to inform the scoping baseline:

- National Risk Register of Civil Emergencies (Cabinet Office, 2017);
- BGS GeoIndex Onshore (BGS, 2022);
- HSE's COMAH 2015 Public Information Search (HSE, 2015); and
- Google aerial and street view maps covering the study area (Google, 2020).

6.14.4 As the Proposed Development's design progresses, additional datasets may be included where relevant to assist the assessment of MA&Ds.

Environmental Baseline of Relevance to MA&Ds

6.14.5 A description of the environmental baseline of the different parts of the Proposed Development Site is presented in Section 2: Description of the Existing Environment, so is not repeated here.

6.14.6 Teesside has a temperate oceanic climate typical of the UK. Four earthquakes (of maximum magnitude 3.1) have been recorded in the Study Area since 1994, but none of these were classified by the BGS as significant. As described in Section 6.3: Surface Water, Flood Risk and Water Resources, parts of the Proposed Development Site are located within Flood Zones 1, 2, and 3.

Infrastructure and Industrial Sites

6.14.7 The Teesside area is a significant industrial hub, with the chemical industry operating in this location for over a hundred years. Chemicals still make up a large proportion of the industrial sites in the area, along with oil and gas facilities and the nearby Hartlepool nuclear power station.

6.14.8 There are currently several COMAH regulated sites within the Study Area with operations in the following categories:

- bulk and fine chemical Installations, with operations (including manufacture/production, disposal, storage/warehousing and distribution);
- fuel Installations, including refining and storage/distribution;
- waste storage, treatment and disposal sites;
- water and sewage collection, supply and treatment; and
- power generation, supply and distribution.

6.14.9 Due to the nature of industry in Teesside, there is an existing network of buried pipelines present in the vicinity of the Main Sites A and B, including major hazard pipelines regulated in accordance with the PSR (1996). There is also significant infrastructure associated with the transmission and distribution of energy including high voltage (HV) 400 kV overhead power lines in the vicinity of Main Sites A and B.

6.14.10 Transport infrastructure in the area includes ports, road and railway lines. Teesport, located approximately 1 km to the south-west of Main Site A, is the UK's fifth biggest

seaport, handling 28 million tonnes of cargo annually. Primary roads in the area include the A19, A174, A66, and the A689. Middlesbrough, Billingham, South Bank, Seaton Carew and South Bank train stations and their associated rail lines also fall within the Study Area. Teesside Airport is the nearest airport, located approximately 11.5 km south-west of the Proposed Development Site.

6.14.11 The nearest residential areas to Main Sites A and B include areas within the districts of Middlesbrough and Redcar & Cleveland. There are also residential receptors close to the hydrogen pipeline and connections within the districts of Stockton-on-Tees and Hartlepool.

6.14.12 The estimated total populations of Middlesbrough, Redcar & Cleveland, Stockton-on-Tees, and Hartlepool are 143,900, 136,500, 196,600, and 92,300, respectively (ONS, 2022).

Sensitive Environmental Receptors of Relevance to MA&Ds

6.14.13 The following sensitive receptors which could be vulnerable to a MA&Ds have been identified:

- private residences (and their inhabitants) within the local area;
- local economic receptors including businesses and employees;
- community receptors, including PRoW, community land, and community buildings;
- the historic and cultural environment including archaeological heritage and built heritage;
- designated ecological sites, primarily the Teesmouth and Cleveland Coast SPA, Ramsar site and SSSI;
- the water environment, including groundwater, the River Tees, and the North Sea;
- infrastructure and built environment including transport infrastructure, industrial infrastructure, and energy infrastructure; and
- the interactions between the receptors above.

Summary of Current MA&Ds Risks

6.14.14 The Proposed Development Site is located within an area which has several COMAH installations, forming a 'domino group'. These are groups of sites where the risks or consequences of a major accident may be increased due to the proximity of the sites to each other. These risks include, but are not limited to: fire, explosion, release of (flammable, toxic, asphyxiant, corrosive, environmentally harmful etc.) substances to air, water, ground and groundwater.

6.14.15 There are no substantive differences in the baseline conditions between Main Site A and Main Site B. T, therefore the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

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- 6.14.16 There is no specific guidance available which sets out the approach for undertaking a MA&Ds assessment within an EIA. However, the scope of the assessment has been developed with reference to “Major Accidents and Disasters in EIA: A Primer” (IEMA, 2020) which lays out emerging best practice. In addition to this guidance, there is a considerable amount of information and guidance available to developers on the identification and control of major hazards associated with industrial chemical processes, the storage and use of chemicals, and major accident hazard pipelines conveying hazardous fluids.
- 6.14.17 MA&D scenarios will be considered for each phase of the Proposed Development.
- 6.14.18 The following process has been used to identify credible MA&Ds scenario categories, to be scoped in or out of detailed assessment in the ES:
- An assessment of the substances which will be present on site to identify those classified as hazardous in accordance with the Classification, Labelling and Packaging (CLP) Regulations 2015.
 - A review of the operations and activities carried out throughout the lifecycle of the Proposed Development, to determine the potential for a loss of containment of these materials. Substances which are not classified as hazardous or are present in relatively minor quantities can be discounted at this stage.
- 6.14.19 Incidents which could have relatively minor consequences, regardless of the likelihood of occurrence, are scoped out of assessment as they do not fall into the definition of a MA&D.
- 6.14.20 Incidents which could have significant consequences to people and/ or the environment are considered credible MA&Ds scenarios. For the Proposed Development, the definition of significant consequences would align with the criteria listed within the COMAH Regulations. This includes an event which causes fatal injuries to one or more people or causes harm to 0.5 ha of a protected environmental site.
- 6.14.21 A long list of potential MA&Ds categories is presented in Appendix B and includes the initial assessment used to determine whether or not further assessment is required. From this list, MA&Ds which are considered very unlikely to occur (for example due to the location of the Production Facility) have been scoped out. Furthermore, any hazards for which there is no credible source-pathway-linkage have also been scoped out.
- 6.14.22 All remaining MA&Ds have therefore been scoped into the assessment. Where there is a lack of information at this time regarding any MA&Ds, this has been scoped in as a precautionary measure. The long list of credible MA&Ds is subject to change as more information becomes available during the course of the assessment.
- 6.14.23 Where a scoped-in MA&D risk is covered fully in a separate discipline chapter, this information will not be duplicated in the MA&Ds chapter but will be cross-referenced and summarised as required with relevance to MA&Ds.
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6.14.24 Events with a high likelihood of occurrence and significant consequences are not associated with the Proposed Development. Legislation including COMAH and PSR ensures that facilities with this category of risk are not permitted.

6.14.25 The key substances which would be present at the Production Facility include the following:

- H₂, which is classified as extremely flammable. The production of H₂ is the purpose of the Proposed Development, however, if released, could result in a fire and/ or explosion.
- Natural gas, which is used to manufacture H₂. It is a hydrocarbon mixture comprising mostly of CH₄, which is classified as extremely flammable. If released, there is the potential for a fire and/ or explosion.
- Syngas ('Synthesis Gas'), which is produced in an intermediate process stage and is a mixture comprising H₂, CO, which is classified as toxic and CO₂. The hazards associated with this substance include a fire and/ or explosion. If unignited, the CO content of this gas could cause harm to people onsite.
- O₂, which is used in the production process, is classified as an oxidant, therefore can cause or intensify a fire if released and in contact with combustible materials. This includes both liquid and gaseous oxygen.
- CO₂, which is produced as a by-product of the manufacturing process and would be exported offsite via pipeline. If a significant quantity of CO₂ is released in high concentrations, this gas can present a risk of asphyxiation.
- Aqueous NH₃, which would be used to reduce emissions from combustion equipment. This substance is classified as harmful to the aquatic environment, however, is unlikely to present in significant quantities. There is a low potential for a major accident and can therefore be scoped out of the assessment.
- An amine solution, which would be used for carbon capture. This type of substance is generally classified as harmful, as it would cause irritation if inhaled or in contact with the skin or eyes. It is not considered to present a risk of a major accident hazard therefore is scoped out of the assessment.
- Substances would be used to treat water and effluent generated by process operations such as biocides. The quantities stored on site are considered to be relatively minor therefore a release would not be a credible MA&Ds scenario and can be scoped out.
- Diesel, which would be used on-site for fuel in backup generators, is classified as flammable and harmful to the aquatic environment. The quantity of diesel would be relatively minor and there is a low potential for a major accident therefore can be scoped out of the assessment.
- Catalyst materials, which would be used for a number of processes including gas purification and steam reformation of natural gas and hydrocarbons.

- Liquid nitrogen, which would be associated with the ASU. It would be used for purging at start-up and shutdown, and for circulation during plant warm-up.
 - Substances used during construction such as liquid concrete could be present in significant quantities and would be harmful if a release occurred in which material entered a watercourse. However, the controls around the storage and use of this substance are such that this is not considered to be a credible MA&Ds scenario.
 - There is the potential for ground contamination in the area of the Main Site which is a legacy of the industrial nature of the site. This could include substances which if released to the environment have the potential to cause harm.
 - No specific materials have been identified at this stage which would only be present on-site during decommissioning.
- 6.14.26 The pipeline corridors associated with the Proposed Development would contain natural gas supplied to the site, H₂ delivered to offtakers within the Teesside industrial area and CO₂ which would be exported for geological storage.
- 6.14.27 The technology used for the manufacture of H₂ from natural gas is well established and the equipment to be used will be designed and constructed to precise industry standards. This industry is subject to rigorous safety and environmental regulations, with operators of such facilities required to demonstrate integrity via the submission of Safety Case documentation. In addition, the operational site will be regulated through other consents and licences as outlined in Section 3.10: Materials Storage, such as Hazardous Substances Consent, COMAH Licensing, and an environmental permit and these regulatory regimes will demand appropriate systems, controls and management procedures to safeguard workers and off-site receptors. There is a very low risk of failure to occur which could result in a loss of containment of hazardous substances. However, if this were to happen, credible and worst-case major accident scenarios have been identified for assessment as part of the EIA.
- 6.14.28 For those MA&Ds category types which have been scoped in for detailed assessment in the ES, the following assessment process which will be used:
- collate and review relevant baseline information regarding location, hazardous properties of substances, and site operations;
 - identify credible scenarios related to the scoped in major event types;
 - determine the potential impact of credible scenarios on receptors;
 - assess the magnitude and likelihood of impacts of credible scenarios;
 - identify mitigation measures to eliminate risk where possible; and if not possible, to reduce risk to a level demonstrated to be as low as reasonably practicable (ALARP); and
 - qualitatively consider the significance of any residual risks.
- 6.14.29 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.15 Materials and Waste

Baseline Conditions

- 6.15.1 The Study Areas for the materials and waste assessment will be defined in line with the IEMA Guide to: Materials and Waste in Environment Assessment, Guidance for a Proportionate Approach (referred from herein as the 'IEMA Guidance') (IEMA, 2020).
- 6.15.2 Baseline data relevant to the Proposed Development has been reviewed to date for:
- impacts on allocated/safeguarded mineral and waste sites within the Proposed Development Site (operational sites identified within local plans e.g. quarries, wharfs, concrete plants etc.);
 - presence of historic and permitted landfills within the Proposed Development Site;
 - presence of permitted waste sites and waste site applications within the Proposed Development Site; and
 - presence of Mineral Safeguarding Areas (MSAs) within the Proposed Development Site (an area designated by Minerals Planning Authorities (MPAs) which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development).
- 6.15.3 Additional baseline information will be gathered and presented in the PEI Report and ES for:
- construction and operational waste generation within the Proposed Development Site;
 - use of construction materials within the Proposed Development Site;
 - non-hazardous, inert and hazardous construction and operational waste management (Yorkshire and the Humber and the North-East regions);
 - hazardous construction waste and operational waste management (England); and
 - availability of key construction materials (nationally and Yorkshire and the Humber and the North-East regions).
- 6.15.4 An initial review of baseline conditions within the Proposed Development Site has been undertaken and consists of:
- historic landfill sites and permitted landfill sites as shown in the Environment Agency's Historic Landfill Sites (Environment Agency, 2021a) and Permitted Waste Sites - Authorised Landfill Site Boundaries data sets (Environment Agency, 2021b), further information is provided in Section 6.4: Geology, Hydrogeology and Contaminated Land;
 - a number permitted waste sites and waste site applications as outlined in the Environment Agency's Environmental Permitting Regulations – Waste Sites (Environment Agency, 2022f);
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- a safeguarded wharf, and a MSA for marine dredged Sand and Gravel at Tees Dock (Redcar and Cleveland) and a safeguarded wharf at Billingham Reach Industrial Estate (Stockton on Tees) (Tees Valley, 2011a);
 - a MSA for gypsum (anhydrite) across the whole of the Tees Valley plan area (Tees Valley, 2011a) and a MSA for salt in Redcar and Cleveland Local Plan area (Redcar and Cleveland Borough Council, 2018);
 - a General Location for Large Waste Management Facilities, this covers industrial areas to the north and south of the River Tees (Tees Valley, 2011a); and
 - safeguarded sites at Haverton Hill (Stockton-on-Tees, construction, and demolition waste recycling) and South Tees Eco-Park (Redcar and Cleveland). The Proposed Development Site is adjacent to New Road, Billingham (Stockton-on-Tees, construction and demolition waste recycling) (Tees Valley, 2011b).
- 6.15.5 There are no substantive differences in the baseline conditions between Main Site A and Main Site B. Therefore, the baseline conditions as outlined above apply and are relevant to both.
- Scope of the Assessment
- 6.15.6 The assessment will follow the methodology set out in the IEMA Guidance (IEMA, 2020).
- 6.15.7 For the purpose of this scoping report, materials and waste comprise:
- the consumption of materials (key construction materials only); and
 - the generation and management of waste.
- 6.15.8 Materials are defined in the IEMA Guidance materials as *“physical resources that are used across the lifecycle of a development. Examples include key construction materials such as concrete, aggregate, asphalt and steel.”*
- 6.15.9 Other material assets considered include built assets such as landfill void capacity and allocated/safeguarded mineral and waste sites.
- 6.15.10 Waste is defined as per the Waste Framework Directive (E Waste FD) (EU, 2008) as *“any substance or object which the holder discards or intends or is required to discard”*.
- 6.15.11 IEMA Guidance offers two methods for the assessment of waste. Method W1 – void capacity has been selected as this is a more detailed methodology and is appropriate for larger and more complex projects.
- 6.15.12 The IEMA guidance *“does not consider waste processing and recovery facilities as sensitive receptors, rather: they are part of a system that has the potential to reduce the magnitude of adverse impacts associated with waste generation and disposal. Waste processing and recovery facilities are, hence, different to landfills, in that the latter are finite resources.”* However, since some of the operational hazardous wastes likely to be generated by the Proposed Development may not be suitable for landfill disposal (e.g. liquid waste), where possible, hazardous operational waste will

be compared to national hazardous waste management facility capacity in the assessment.

6.15.13 The assessment of materials and waste will consider:

- waste producers have a legal duty of care to manage their waste in accordance with regulations and to ensure that any waste leaving the Proposed Development Site where it is generated is transferred to a suitably licensed facility for further treatment or disposal;
- facilities transferring, treating or disposing of waste must be either licensed or apply for an exemption from a license, and impacts arising from the operation of waste management facilities are considered as part of the planning and permitting process for these facilities themselves;
- as part of their planning function, Waste Planning Authorities (WPAs) are required to ensure that sufficient land is available to accommodate facilities for the treatment of all waste arising in the area, either within the WPA area, or through export to suitable facilities in other areas; and
- MPAs are similarly required to ensure an adequate supply of minerals, sufficient to meet the needs of national and regional supply policies, and local development needs.

6.15.14 The following matters will be scoped out of the assessment of materials and waste:

- Waste arising from extraction, processing and manufacture of construction components and products. This is based on the assumption that these products and materials are being developed in a manufacturing environment with their own waste management plans, facilities, and supply chain, which are potentially in different regions of the UK or the world and outside of the geographical scope of this study. Such matters cannot be accurately predicted and assessed in the ES as they relate to procurement decisions that cannot be assured.
- Other environmental impacts associated with the management of waste from the Proposed Development (e.g. on water resources, air quality, noise or traffic resulting from the generation, handling, on-site temporary storage or off-site transport of materials and waste) are addressed separately in other relevant chapters.
- Direct impacts on MSAs. The Proposed Development Site lies within MSAs however impacts on MSAs are not assessed in the materials and waste assessment in accordance with the IEMA Guidance. MSAs are included for context in the baseline since MSAs are a planning consideration. The Proposed Development uses previously developed industrial land or existing utilities corridors. The Proposed Development would not sterilise or prejudice the future extraction of the mineral resource because the anhydrite and salt resources occur at depth and can either be extracted in an alternative way (mining or brine solution) or there is evidence that the resource may have been sufficiently

depleted by previous extraction (anhydrite). This would be considered further in the Planning Statement submitted with the Application.

- Effects associated with decommissioning as the Proposed Development has a long design life and such it is not considered possible to reliably forecast decommissioning requirements and infrastructure far in the future. A Decommissioning Environmental Management Plan and would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated.

6.15.15 Due to the uncertainty about the nature of mitigation(s) and the method by which mitigation(s) would be secured, material use and waste generation during the construction and waste generation during operation of the Proposed Development is scoped into the assessment. Allocated/safeguarded mineral and waste sites are scoped into the assessment, such sites are a planning consideration and further consultation and assessment in accordance with MPA policies may be required.

Table 6-8 Table 6-8 provides a summary of the matters to be scoped in and out of the assessment.

Table 6-8: Summary of Proposed Scope of Materials and Waste

PROPOSED DEVELOPMENT PHASE	POTENTIAL EFFECTS	SCOPE IN/ OUT
Construction	Changes in demand for materials	Scope in
	Changes in available landfill capacity	Scope in
	Changes to allocated/safeguarded mineral site	Scope in
	Changes to allocated/safeguarded waste site	Scope in
Operation	Changes in availability of materials	Scope out
	Changes in available landfill void capacity	Scope in
	Changes in available waste management facility capacity (hazardous waste only)	Scope in
Decommissioning	Changes in demand for materials	Scope out
	Changes in available landfill capacity	Scope out
	Changes to allocated/safeguarded mineral site	Scope out
	Changes to allocated/safeguarded waste site	Scope out

6.15.16 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.16 Human Health

Baseline Conditions

6.16.1 Public health profile data produced by Public Health England (PHE) (PHE, 2022a), published under the Public Health Outcomes Framework (PHOF) (PHE, 2022b) has been reviewed for the purposes of this EIA Scoping Report. A human health profile will be developed for the PEIR which focuses on key indicators identified by PHE at

ward level, including a comparison with district and national averages. This profile will be consolidated by engaging with the Integrated Care Board and the relevant local authorities.

6.16.2 The Proposed Development Site intersects seven electoral wards:

- South Bank, in Redcar and Cleveland;
- Dormanstown, in Redcar and Cleveland;
- Grangetown, in Redcar and Cleveland;
- Billingham East, in Stockton-on-Tees;
- Billingham South, in Stockton-on-Tees;
- Fens and Greatham, in Hartlepool; and
- Seaton, in Hartlepool.

6.16.3 For each of these areas, indicators deemed relevant to the likely human health effects of the Proposed Development have been identified; data relating to these indicators and the comparative geographies is set out in Table 6-9.

6.16.4 An initial review of the human health baseline has been undertaken using a number of recognised data sources including:

- Census 2020 (ONS, 2021);
- Census 2011 (ONS, 2012)¹⁶;
- Population Estimates (ONS, 2022); and
- PHE (2022a; 2022b).

6.16.5 The list above is intended to provide an outline of sources and it should be noted that additional datasets may be used in the preparation of the PEI Report.

6.16.6 There are no substantive differences in the baseline conditions between Main Site A and Main Site B, therefore the baseline conditions as outlined above apply and are relevant to both.

Scope of the Assessment

6.16.7 This chapter will identify the communities that would be subject to impacts associated with the Proposed Development and will identify the potential effects on the health and wellbeing of those communities in Redcar and Cleveland and Stockton-on-Tees, Teesside and wider area if required, as a consequence of the Proposed Development.

¹⁶ Please note that data from the 2011 Census has only been used in the absence of more recent data.

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- 6.16.8 This chapter will consider the Proposed Development in the context of established national and local policy standards and best practice benchmarks. This will include human health policy alignment with the Proposed Development.
- 6.16.9 In November 2022, the Institute of Environmental Management and Assessment (IEMA) published new guidance on assessing human health as part of EIA (IEMA, 2022b; IEMA, 2022c). Prior to this, there was no consolidated methodology or practice for the assessment of human health effects. The human health assessment will be based on this new IEMA guidance and it will consider the potential impacts for each phase of the Proposed Development. Wherever possible, the impacts identified in the assessment will be appraised against relevant national standards. Where relevant standards do not exist, professional experience and expert judgement will be applied and justified.

Table 6-9: Human Health Baseline Indicators

	FENS AND GREATHAM	SEATON	BILLINGHAM EAST	BILLINGHAM SOUTH	DORMANSTOWN	GRANGETOWN	SOUTH BANK	HARTLEPOOL	STOCKTON-ON-TEES	REDCAR AND CLEVELAND	ENGLAND
Population aged under 16 (%) (2020/21)	13.8	17.6	24.1	21.1	20.4	28.6	24.0	19.2	20.0	17.7	19.2
Population aged 65+ (%) (2020/21)	31.0	23.7	15.9	19.1	19.0	11.0	14.8	19.6	18.7	23.3	18.5
Unemployment rate (% claiming out of work benefit) (2021/22) ¹⁰	-	-	6.8	5.8	6.9	12.7	10.7	6.8	5.4	5.5	5.0
Long-term unemployment (%) (2021/22) ¹⁰	-	-	4.5	3.8	2.4	13.6	9.4	3.1	4.0	4.4	1.9
General Health – good or very good (%) (2011)	75.9	78.7	75.4	77.1	75.1	75.5	72.2	76.0	79.9	76.3	81.4
General Health – bad or very bad (%) (2011)	7.5	6.5	8.2	7.7	8.7	9.2	9.8	8.1	6.3	7.8	5.5
Life expectancy at birth (female) (years) (2016-20)	86.2	81.8	79.0	79.5	80.9	78.9	75.2	81.3	81.3	81.5	83.2
Life expectancy at birth (male) (years) (2016-20)	81.4	78.8	75.5	77.7	74.4	72.5	73.0	76.5	78.2	77.6	79.5

	FENS AND GREATHAM	SEATON	BILLINGHAM EAST	BILLINGHAM SOUTH	DORMANSTOWN	GRANGETOWN	SOUTH BANK	HARTLEPOOL	STOCKTON-ON-TEES	REDCAR AND CLEVELAND	ENGLAND
Obese adults (%) (2020/21) ¹⁷	-	-	-	-	-	-	-	34.6	40.2	33.4	25.3
Obese children (reception year) (%) (2020/21)	11.1	8.3	8.6	14.3	16.6	13.7	14.0	12.8	9.8	12.0	9.9
Smoking prevalence in adults (%) (2021) ¹⁰	-	-	-	-	-	-	-	17.3	12.5	13.3	13.0
Mortality rate from Chronic Obstructive Pulmonary Disease (COPD) (2017-19) ¹⁰	-	-	-	-	-	-	-	77.9	62.5	79.6	52.8
Physically inactive adults (%) (2020/21) ¹⁰	-	-	-	-	-	-	-	36.7	23.1	28.0	23.4

Sources: Census 2011 (ONS, 2011); Census 2021 (ONS, 2021); Population Estimates (ONS, 2021); Local Health Profiles (Public Health England, 2016-21).

¹⁷ Please note that ward level data for this indicator is unavailable from PHE.

6.16.10 If a change in a wider determinant of health is likely, it should be scoped into the human health assessment. The assessment must present the 'likely significant' human health effects of the Proposed Development. At the scoping stage, there are uncertainties, and there is limited insight into significance, therefore scoping identifies whether health effects are 'potentially significant' or not. Potentially significant human health effects are anticipated relating to the following determinants:

- physical activity;
- risk taking behaviour;
- open space, leisure, and play;
- transport modes, access, and connections;
- community safety;
- community identity, culture, resilience, and influence;
- social participation, interaction, and support;
- education and training;
- employment and income;
- climate change mitigation and adaptation;
- air quality;
- water quality or availability;
- land quality;
- noise and vibration;
- health and social care services;
- built environment; and
- wider societal infrastructure and resources.

6.16.11 The following determinants have been scoped out of the assessment as they're not relevant to the Proposed Development:

- diet and nutrition;
- housing;
- relocation; and
- radiation.

6.16.12 The following other ES chapters will inform the human health assessment:

- Chapter 8: Air Quality;
 - Chapter 11: Noise and Vibration;
 - Chapter 15: Traffic and Transportation;
-

- Chapter 18: Socio Economics and Land-Use; and
- Chapter 19: Climate Change.

6.16.13 The scope of assessment set out above would be applied whether Main Site A or B is taken forward to the final development design.

6.17 Cumulative and Combined Effects

Cumulative Effects

6.17.1 In accordance with the EIA Regulations, consideration will also be given to the potential for cumulative effects to arise. Cumulative effects may occur when environmental effects associated with the Proposed Development interact with those associated with other planned projects and developments located in the vicinity.

6.17.2 The effects of the Proposed Development for each of the ES topics described above will therefore be considered in conjunction with the potential effects from other projects which are both reasonably foreseeable in terms of delivery (e.g., have planning consent) and are located within a relevant geographical scope where environmental impacts could act together to create a more significant overall effect, and reported within the ES.

6.17.3 A number of other proposed developments have been identified in the vicinity of the Proposed Development Site that could potentially result in cumulative effects during construction and operation of the Proposed Development. Those developments most likely to result in significant cumulative effects in combination with the Proposed Development are listed below and illustrated on Figure 15: Other Developments to be Considered in the Cumulative Impact Assessment (Appendix A). This is not an exhaustive list and will be developed further in the PEI Report.

6.17.4 The Applicant will consult with RCBC, STBC, HBC, and other neighbouring local authorities in order to define the full list of current and future developments/projects to be considered.

HyGreen

6.17.5 HyGreen is another bp led project which is in the early stages of design and planning. HyGreen is a proposed green H₂ production facility, which is currently subject to further engineering and environmental studies likely to be located in close proximity to the Proposed Development Site. It is currently at pre-planning stage.

Net Zero Teesside

6.17.6 NZT is a proposed full chain CCUS project, comprising a CO₂ gathering network, including CO₂ pipeline connections from industrial facilities on Teesside to transport the captured CO₂; a CCGT electricity generating station with an abated capacity circa 860 megawatts output (gross), cooling water, gas and electricity grid connections and CO₂ capture; a CO₂ gathering/booster station to receive the captured CO₂ from the gathering network and CCGT generating station; and the onshore section of a CO₂ transport pipeline for the onward transport of the captured CO₂ to a suitable offshore geological storage site in the North Sea. The NZT Power, Capture and

Compressor (PCC) Site is proposed to be located to the immediate east of the Main Site for the Proposed Development.

- 6.17.7 The project will require a DCO to enable its construction and operation. The examination period closed on 10th November 2022 and the SoS decision is expected on 10th May 2023.

Tees Combined Cycle Power Plant (CCPP)

- 6.17.8 Tees CCPP is a proposed gas-fired combined cycle gas turbine (CCGT) power station with a maximum generating capacity of up to 1,700 MW. It is proposed on approximately 15 ha of land formerly used as a gas-fired generating station within the south-west part of the Wilton International Complex, to the south of the Proposed Development Site. The DCO application was approved in April 2019 but is understood to be undergoing an amendment to enable development of the Whitetail project – a proposed 300 MW power plant at Sembcorp Energy UK’s Wilton International site, with CCS. It is expected that construction of the Tees CCPP will begin in 2024, with the generating station becoming operational in 2027.

York Potash Harbour Facilities

- 6.17.9 In July 2016, the SoS for Transport made the York Potash Harbour Facilities Order 2017 that came into effect in August 2017. The order authorised the installation of wharf/ jetty facilities with two ship loaders capable of loading bulk dry material at a rate of 12 million tonnes per annum (dry weight), as well as associated dredging operations, a storage building with conveyor to wharf/jetty and a materials handling facility with conveyor to storage building and jetty, to the south of Main Site A for the Proposed Development.

- 6.17.10 It forms part of the wider York Potash Project (now referred to as the Woodsmith Project) which includes the development of a new mine for the winning and working of the only known UK resource of polyhalite. The harbour facilities are required to enable the bulk export of polyhalite.

York Potash Material Handling Facility

- 6.17.11 In September 2014, York Potash Ltd submitted a planning application for a mineral (polyhalite) granulation and storage facility involving the construction of buildings, conveyor systems, substations, water treatment plant, internal access roads, car parking, attenuation ponds, landscaping, restoration and aftercare, and construction of a tunnel portal including the landforming of spoil and associated works. The development is located approximately 0.3 km to the south of Main Site A and adjacent to Main Site B. The application was granted in August 2015. Construction is currently underway.

MGT Teesside Tees Renewable Energy Plant (REP)

- 6.17.12 The Tees REP is a proposed 300 MW biomass fired renewable energy power station on land adjacent to the main southern dock at Teesside on the south bank of the River Tees, to the south-west of the Main Site A for the Proposed Development.

6.17.13 Construction of the project commenced in August 2016, but has experienced a number of delays, including a fire and a temporary suspension due to the Covid-19 pandemic. It is potentially going to be operational within the next 1-2 years.

Redcar Energy Centre (REC)

6.17.14 Redcar Energy Centre (REC) is a proposed a material recovery facility incorporating a bulk storage facility, an energy recovery facility, and an incinerator bottom ash recycling facility along with ancillary infrastructure and landscaping, located to the immediate west of the Main Site A for the Proposed Development. A planning application for REC was submitted in August 2020 and granted in January 2021; it was anticipated that construction would begin within approximately 15 months of the 198 decision date but as of March 2023 construction is yet to begin.

CBRE Anaerobic Biogas Production Facility

6.17.15 In July 2016, CBRE submitted a planning application for an anaerobic biogas production facility and CHP plant, southeast of the Main Site for the Proposed Development. This facility would involve the anaerobic digestion of mixed feedstock to create a biogas to be used as fuel in the CHP. Planning permission was granted in October 2016, but construction is yet to begin.

Tees Valley Lithium Project

6.17.16 In September 2022, Tees Valley Lithium Ltd submitted a planning application for the construction of a lithium hydroxide monohydrate manufacturing plant and ancillary development (the 'Tees Valley Lithium Project'), within Wilton International Estate, Redcar. Planning permission was granted in November 2022. The development is located within the Wilton International estate, south-east of Main Sites A and B. The development will be constructed on a phased basis and eventually comprise four process trains. Train 1 will employ a caustication process, whilst Trains 2, 3 and 4 will utilise an electrochemical process. It is anticipated that construction of Train 1 will be complete by Q4 2024, and construction of Trains 2, 3 and 4 will be complete by Q4 2025.

South Tees Development Corporation Projects

6.17.17 STDC have recently submitted a number of planning applications in the vicinity of the Proposed Development Site, primarily for demolition works and engineering operations associated with ground remediation and preparation for regeneration and development. They are also in the process of preparing a number of planning applications for development of general industry (Use Class B2) and storage or distribution facilities (Use Class B8) with office accommodation (Use Class E), HGV and car parking, works to watercourse including realignment and associated infrastructure works.

Offsite Hydrogen Storage

6.17.18 As identified in Section 3.9, off-site storage of H₂ is not included within the Proposed Development. Should there be the requirement for off-site storage, it is expected that these would be owned and operated by a third-party provider who would be responsible for any consenting requirements. Detail regarding this will be limited, with any potential developments being at pre-planning stage, but the potential for

cumulative effects will be assessed at a high level, based on the information available at that time.

Combined Effects

- 6.17.19 Combined effects may occur where several different effects from a single development collectively cause an effect of greater or lesser significance upon a particular environmental receptor.
- 6.17.20 An assessment of potentially significant combined effects, considering each of the ES topics described above, will be undertaken, and reported in the ES.

7.0 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

7.1 EIA Methodology and Reporting

7.1.1 The ES will set out the process followed during the EIA including the methods used for the collection of data and for the identification and assessment of impacts. Any assumptions made will be clearly identified.

7.1.2 The EIA process is designed to be capable of, and sensitive to, changes that occur as a result of changes to the design, including any mitigation measures that are incorporated during the EIA. This will be particularly important for the Proposed Development as the design and layout is still being refined, and minor changes are likely to be made following submission of this EIA Scoping Report.

7.1.3 The EIA will be based on a number of related activities, as follows:

- establishing existing baseline conditions;
- consultation with statutory and non-statutory consultees throughout the Application process;
- consideration of relevant local, regional and national planning policies, guidelines and legislation relevant to EIA;
- consideration of technical standards for the development of significance criteria;
- review of secondary information, previous environmental studies and publicly available information and databases;
- physical surveys and monitoring;
- desk-top studies;
- computer modelling;
- reference to current legislation and guidance; and
- specialist opinion.

7.1.4 Impacts will be considered on the basis of their magnitude, duration and reversibility. Cumulative and combined effects will also be considered where appropriate. Significance will be evaluated on the basis of the scale of the impact and the importance or sensitivity of the receptors, in accordance with standard assessment methodologies (major, moderate, minor and negligible). For the purpose of the EIA, moderate and major effects will be deemed 'significant'.

7.1.5 Where likely significant environmental effects are identified in the assessment process, measures to mitigate these effects will be recommended.

7.2 Structure of the Environmental Statement

7.2.1 The ES will address the direct effects of the Proposed Development in addition to the likely indirect, cumulative, short, medium and long term, permanent, temporary, beneficial and adverse effects. The mitigation measures envisaged in order to prevent, reduce or where possible offset significant adverse effects will also be

described. The concluding chapters will provide a summary of the cumulative and combined effects and likely significant residual environmental effects.

7.2.2 The ES will comprise the following set of 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: this will contain the full text of the EIA with the proposed Chapter headings as follows:
 - Introduction;
 - Assessment Methodology;
 - Description of the Existing Environment;
 - Proposed Development;
 - Construction Programme and Management;
 - Alternatives and Design Evolution;
 - Legislative and Planning Policy Context;
 - Air Quality;
 - Surface Water, Flood Risk and Water Resources;
 - Geology, Hydrogeology and Contaminated Land;
 - Noise and Vibration;
 - Ecology and Nature Conservation (including Aquatic Ecology);
 - Ornithology;
 - Marine Ecology and Nature Conservation;
 - Traffic and Transportation;
 - Landscape and Visual Amenity;
 - Cultural Heritage;
 - Socio Economics and Land-Use;
 - Climate Change;
 - Major Accidents and Disasters;
 - Materials and Waste;

- Human Health;
 - Cumulative and Combined Effects; and
 - Summary of Significant Effects.
- Volume II: Technical Appendices: these will provide supplementary details of the environmental studies conducted during the EIA including relevant data tables, figures and photographs; and
 - Volume III: Figures: Stand-alone figures volume containing all figures not included separately within the technical appendices.

7.3 Structure of Technical Chapters

7.3.1 The technical chapters (Volume I) will be structured based on the following sub-headings:

Introduction

7.3.2 The Introduction will describe the format of the assessment presented within the chapter.

Legislation and Planning Policy Context

7.3.3 The Legislation and Planning Policy Context 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.

Assessment Methodology and Significance Criteria

7.3.4 The methods used in undertaking the technical study will be outlined in this section with references to published standards (e.g., British Standards, Building Research Establishment), guidelines (e.g., DMRB and IEMA guidelines) and relevant significance criteria.

7.3.5 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 carried out, based on available knowledge and professional judgment. Where uncertainty exists, this will be noted in the relevant technical assessment chapter.

7.3.6 Specific criteria for each technical assessment will be developed, giving due regard to the following:

- extent and magnitude of the impact;
- impact duration (whether short, medium or long term);
- impact nature (whether direct or indirect, reversible or irreversible);
- whether the impact occurs in isolation, is cumulative or interactive;
- performance against environmental quality standards where relevant;

-
- sensitivity of the receptor; and
 - compatibility with environmental policies and standards.
- 7.3.7 For issues where definitive quality standards do not exist, significance will be based on the:
- local, district, regional or national scale or value of the resource affected;
 - number of receptors affected; and
 - sensitivity of these receptors; and duration of the impact.
- 7.3.8 The ES will clearly explain any assumptions that have been made in the assessments including definition of the maximum parameters used in accordance with the Rochdale Envelope approach.
- 7.3.9 In order to provide a consistent approach to expressing the outcomes of the various studies undertaken as part of the EIA, and thereby enable comparison between effects upon different environmental components, the following terminology will be used throughout the ES to define effects, unless technical chapters set out otherwise:
- 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, legislation, policy or standards.

Baseline Conditions

- 7.3.10 In order to assess the potential impacts and effects of the Proposed Development, it is necessary to determine the environmental conditions that currently exist on site and in the surrounding area, for comparison. These are known as the 'existing baseline conditions'. Baseline conditions are determined using the results of site surveys and investigations or desk-based data searches, or a combination of these, as appropriate.
- 7.3.11 'Future baseline conditions', which are the likely future conditions in the study area in the absence of the Proposed Development, will also be considered and described.

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- 7.3.12 For the purposes of assessment, each chapter will identify a reasonable ‘worst case scenario’ with regards in relation to optionality within the Proposed Development and future baseline scenarios.

Development Design and Impact Avoidance

- 7.3.13 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 will take account of these measures already being in place.

Likely Impacts and Effects

- 7.3.14 This section will identify the likely impacts resulting from the Proposed Development inclusive of the design measures discussed above. The magnitude of impacts is defined with reference to the relevant baseline conditions (existing or future, as appropriate), and effects are determined in accordance with the identified methodology.

Mitigation and Enhancement Measures

- 7.3.15 The Mitigation and Enhancement Measures section will describe the measures that will be implemented by the Applicant to reduce any significant adverse effects identified by the assessment and enhance beneficial effects during construction and operation of the Proposed Development over and above those already included as development design and impact avoidance measures.

Limitations or Difficulties

- 7.3.16 Where in any case it is not possible to quantify effects, qualitative assessments will be undertaken, based on available knowledge and professional judgment. Where any uncertainty exists, this will be clearly outlined in the limitations section of each of the impact assessments chapters. The limitations presented by this uncertainty will be taken into account in defining the reasonable worst-case scenario for the topic assessments.

Cumulative Effects

- 7.3.17 In accordance with the EIA Regulations, consideration will be given to the potential for cumulative effects to arise as a result of the Proposed Development.

Residual Effects and Conclusions

- 7.3.18 Effects of the Proposed Development remaining following the implementation of available mitigation measures are known as ‘residual effects’. These will be discussed for each of the potential effects, and their significance level identified.

7.4 Consultation on the EIA

7.4.1 The process of consultation is critical to the development of a comprehensive and balanced ES. The views of statutory and non-statutory consultees serve to focus the environmental studies and to identify specific issues that require further investigation. Consultation is an ongoing process, which enables mitigation measures to be incorporated into the Proposed Development's design, thereby limiting adverse effects and enhancing environmental benefits.

7.4.2 To date, introductory meetings have been held with Natural England (16th September 2022) and the Environment Agency (4th October 2022). The purpose of these meetings was to introduce the Proposed Development, provide an overview of the programme as and discuss matters which the Applicant will be seeking input from both Natural England and the Environment Agency on, under their respective Discretionary Advice Services (DAS's). Table 7-1, summarises the outcome of these discussions to date.

Table 7-1: Consultation Undertaken to Date of relevance to the EIA

CONSULTEE	SUMMARY OF OUTCOME OF DISCUSSIONS	APPLICANT'S RESPONSE
Natural England	<p>Introductory Meeting September 16th, 2022 (Virtual Microsoft Teams)</p> <p>A meeting was held to provide Natural England with an introduction to the Proposed Development and agree what services the Applicant would seek as part of Natural England's DAS service. Natural England noted that they were unable to provide detailed advice regarding the proposed routing.</p> <p>Natural England did however acknowledge that the proposed pipelines would cross the Teesmouth & Cleveland Coast SSSI, SPA & Ramsar Site, either above or below ground. Natural England have requested further detail regarding the construction phase methodology for the route options route, in order to provide a view as to whether or not the proposed works would have an adverse effect upon the site.</p> <p>Advice sought via the DAS service (written) 9th December 2022</p> <p>Further information on the proposals were provided to Natural England including further information on construction methodologies.</p>	<p>The Applicant provided further information in response to Natural England's request (see below). Further consultation will be required on various matters under the DAS throughout the application process.</p> <p>Natural England provided high level comments on the information presented to them.</p>
Environment Agency	Introductory Meeting October 4 th , 2022 (Virtual Microsoft Teams)	The Environment Agency's comments

CONSULTEE	SUMMARY OF OUTCOME OF DISCUSSIONS	APPLICANT'S RESPONSE
	<p>A meeting was held to provide the Environment Agency with an introduction to the Proposed Development and agree what advice services the Applicant would seek from the Environment Agency under their DAS service.</p> <p>The Environment Agency raised some specific points in relation to the proposals at the time of the introductory call. These included in summary:</p> <ul style="list-style-type: none"> - Some of the proposed pipeline route corridors and interactions with other developments in the area including likely future works to the Greenabella Seawall defences, and especially around the Greatham Area to the west of the Proposed Development Site. - Some of the proposed pipeline route corridors interface with the EA's assets especially flood defences in the Greatham area. 	<p>are being considered, and the feasibility of the suggestions assessed as part of the design process.</p>

7.4.3 Consultation on the Proposed Development will be undertaken in Summer 2023. It will utilise a range of methods, including a project website, to provide up-to-date information and aid consultation with key stakeholders.

7.4.4 As required by Section 47 of the Planning Act 2008 (as amended), the Applicant is preparing a Statement of Community Consultation (SoCC). The SoCC will outline how the Applicant intends to formally consult with the local community about the Proposed Development. The Applicant is required to first consult the relevant local authorities on the draft SoCC, who have a period of at least 28 days following receipt of the draft SoCC to do so, prior to its publication for inspection by the public.

7.4.5 PEI in the form of a PEI Report will be provided for statutory consultation, which is likely to be undertaken in Summer 2023. The statutory consultation will use a range of methods, including the distribution of digital and printed consultation materials, face to face and virtual public events, an online virtual consultation room and postal notifications to those living within a defined zone around the Proposed Development Site, alongside document inspection venues, newspaper notices and letters to statutory consultees as required by sections 47, 48 and 42 of the Planning Act 2008.

7.4.6 All responses received during consultation will be carefully considered and taken into account as the design and EIA of the Proposed Development progresses, in accordance with Section 49 of the Planning Act 2008. Details of any responses

received during consultation and the account taken of those responses will be included in a Consultation Report, as required by Section 37 of the Planning Act 2008.

7.4.7 This Consultation Report will be submitted as part of the application for development consent and will be available for public review at that point. The Consultation Report will demonstrate how the Applicant has complied with the statutory consultation requirements of the Planning Act 2008. It will be considered by PINS, both when determining whether to accept the application and in examining the application.

7.5 Transboundary Effects

7.5.1 On the basis of the information outlined within this scoping report and having regard to the location and spatial scope of the assessments is it considered that the Proposed Development is not likely to have 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.

8.0 SUMMARY AND MATTERS TO BE SCOPED OUT

8.1 Matters Scoped Into the EIA

8.1.1 This Request for a Scoping Opinion has identified the potential for significant environmental effects to arise from the construction (including maintenance where relevant), operation and decommissioning of the Proposed Development. The following specialist assessments for inclusion in the EIA are proposed:

- Air Quality;
- Surface Water, Flood Risk and Water Resources;
- Geology, Hydrogeology and Contaminated Land;
- Noise and Vibration;
- Ecology and Nature Conservation (including Aquatic Ecology);
- Ornithology;
- Marine Ecology and Nature Conservation;
- Traffic and Transportation;
- Landscape and Visual Amenity;
- Cultural Heritage;
- Socio Economics and Land-Use;
- Climate Change;
- Major Accidents and Disasters;
- Materials and Waste; and
- Human Health.

8.1.2 The detailed assessments for each of these topics will be undertaken in accordance with standard guidance and best practice and reported in the ES. Where significant effects are identified, mitigation measures will be described where possible to reduce the residual effects.

8.2 Other Matters Proposed for Scoping Out of the EIA

8.2.1 Where specific matters have been scoped out of the assessments included in Section 7 this has been outlined within those sections and has not been repeated here.

8.2.2 Other matters not included elsewhere are outlined in brief below.

Electronic Interference

8.2.3 It is unlikely that the maximum building heights for any buildings proposed, and temporary construction cranes would not be significantly higher than other structures recently located in the vicinity of the Proposed Development (as a former steelworks) or associated with the proposed NZT development. In addition, there are

no nearby residential properties likely to be affected. Effects from Electromagnetic Fields (EMF) where they relate to human health will be considered and included in brief within the proposed Human Health Chapter once further information on the electrical connections is known.

8.2.4 Therefore, a standalone assessment of the Proposed Development's effect on electronic interference is not considered to be required.

8.2.5 Further to this, analogue signals have ceased to be transmitted and have been replaced by digital signals. As such, the Proposed Development's potential to interfere with television, radio (both analogue and digital) and mobile phone reception is considered negligible.

Aviation

8.2.6 It is proposed to scope out impacts on aviation based on the likely maximum height of the flare and other buildings associated with the Proposed Development. In general, it is considered that in the context of the surrounding industrial facilities these are anticipated to be comparable to the heights of structures that have previously occupied the site at Redcar Steel works.

8.2.7 The Civil Aviation Authority (CAA) will be consulted on the Proposed Development to review any requirements for aviation lighting on the stack(s) and enable the Proposed Development to be charted in future. Should infrastructure or cranes be required which are taller than those currently expected, the need for an aviation assessment will be reviewed accordingly.

9.0 REFERENCES

9.1.1 Below is the full list of reference documents for the EIA Scoping Report, using the Harvard style (to the best of available information). References are listed in order of alphabetical by (lead) author's surname or publishing organisation (or title for legislation only), then chronological with oldest first, and then finally by order of appearance within the Report as indicated by letter following the date.

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APPENDIX A: FIGURES

APPENDIX B: LONG LIST OF MA&D CATEGORIES AND SCOPING STATUS

Table B-1: Long List of Major Accident & Disaster Hazard Categories, and Scoping Status, with Commentary

HAZARD	SCOPED IN (Y/N)	COMMENTARY
Construction Hazards		
Accident Impact/ Structural Collapse/ Utility Strike/ UXO	Y	Construction hazards can include events which have the potential for harm, including fatal injuries to workers. These include the collapse of buildings, structures and excavations, vehicle accidents, contact with HV transmission cables (overhead and buried), contact with underground utility services and UXO. This category is scoped in for further assessment.
Release of Ground Contamination	Y	Preparatory work during construction could encounter significant quantities of contaminated ground due to historic industrial use. If this material is accidentally released to the environment, there is the potential for harm. This category is scoped in for further assessment.
Operational Process Hazards		
Fire	Y	The accidental release of flammable substances could result in a fire if immediately ignited. This could result in harm to people onsite and potentially offsite. This category is scoped in for further assessment.
Explosion	Y	The accidental release of flammable substances could result in an explosion if the gas accumulates prior to ignition. This could result in significant harm to people onsite and potentially offsite. This category is scoped in for further assessment.
Toxic gas release	Y	The accidental release of syngas containing CO could result in a toxic hazard with harm to people onsite. It is unlikely that this could have an impact offsite but is scoped in for further assessment.
Asphyxiant gas release	Y	A significant release of CO ₂ could result in harm to people onsite and potentially offsite therefore is scoped in for further assessment.
Environmentally harmful liquid release	N	A release of aqueous ammonia or diesel which reached environmental receptors could have an impact, however the quantity present on site will likely be relatively small and impact would not reach the criteria for a MA&D therefore is scoped out.
Domino Event	Y	A major incident occurring at a site which is part of the Teesside cluster of major hazard sites could escalate and cause an impact at the Production Facility at the Main Site. Conversely, a major incident could have an impact on neighbouring facilities. Domino effects are therefore scoped in for further assessment.

HAZARD	SCOPED IN (Y/N)	COMMENTARY
Operational Transportation Hazards		
Road traffic accident (dangerous goods)	N	Collisions/ accidents involving road tankers delivering materials to site could result in a loss of containment of diesel and aqueous ammonia. The quantity of these materials would be contained within drainage systems and unlikely to result in a major accident, therefore this category is scoped out.
Marine accident	N	The primary process materials will be transported to and from the site via pipeline, therefore marine transport is not applicable, and this category is scoped out.
Other Industrial Hazards		
Electrical failure	N	During operation, electrical failure or power loss can be caused by supply issues or disruption to infrastructure. Process equipment and instrumentation would be designed to fail to a safe condition and the Proposed Development will include installation of back-up power generation and uninterruptable power supplies (UPS). In an emergency event where all power supplies are lost, a flare will be provided for the safe disposal of gas, consequently this scenario is scoped out.
System / utilities failures	N	Disruption to water supplies and effluent disposal may have an impact on process operations however are unlikely to cause harm to the environment as this would be considered within the design of the facility and the appropriate safety systems installed. Consequently, this scenario is scoped out.
Meteorological Hazards		
High windspeed	N	There is a low probability of a hurricane force event occurring at the Production Facility, however major storms and gales could result in damage due to infrastructure. Storms will be considered during the engineering design of buildings and structures and the appropriate engineering standards used, therefore this category is scoped out.
Low temperatures and heavy snow.	N	The climate in the north-east of England is typically mild. In the event of extreme, prolonged low temperatures and snowfall, there is the potential for snow loading on buildings and freezing liquids in pipework. Operations are unlikely to be interrupted however as these potential issues will be considered within the engineering design and appropriate insulation used. This category is therefore scoped out.
High temperatures / heatwave	N	In the event of a prolonged period of hot weather there is the potential for an impact to temperature

HAZARD	SCOPED IN (Y/N)	COMMENTARY
		sensitive equipment such as process cooling systems and electrical switchgear. This could cause an operational upset but is unlikely to cause harm. These issues will be incorporated within the engineering design and therefore this category is scoped out.
Drought	N	The Proposed Development is not expected to be vulnerable to drought conditions, as there is a low risk of interruptions to the supplies of water in this location therefore this category is scoped out.
Electrical storms	N	Lightning could result in damage to the Proposed Development as a result of a direct strike to buildings or structures. There is also the potential for lightning to act as a source of ignition if damage occurred during the storm causing a loss of containment of flammable gases. Design engineering standards to be incorporated by the Proposed Development for the provision of lightning protection systems on buildings and structures are well established. Consequently, this category is scoped out.
Geophysical Hazards		
Earthquake	N	There is a low record of seismic activity observed at the location of the Proposed Development and severe damage is unlikely, therefore this category is scoped out.
Ground stability	N	Groundworks carried out prior to construction will provide a stable site at the Production Facility and within pipeline connection corridors (where required for new pipelines) prior to construction. The Teesside area has a low risk of landslides, ground collapse, ground compression, or sinkholes associated with site geology, therefore this category is scoped out.
Hydrological Hazards		
Coastal Flood	Y	The Production Facility site is located by the North Sea coast with parts in Flood Zone 3 (greater than 0.5% AEP sea flooding). The risk will be considered within the stand-alone FRA and summarised within the Surface Water, Flood Risk and Water Resources chapter. This is considered a credible MA&D scenario, therefore scoped in for further assessment.
Fluvial Flood	Y	Site is on the River Tees with parts in Flood Zone 3 (greater than 1% AEP river flooding). The risk will be considered within the stand-alone FRA and summarised assessed within the Surface Water, Flood Risk and Water Resources chapter. This is considered a credible MA&D scenario, therefore scoped in for further assessment.

HAZARD	SCOPED IN (Y/N)	COMMENTARY
Pluvial Flood	Y	Parts of the site has a low risk (between 0.1% and 1% flood risk from surface water). The risk will be considered within the stand-alone FRA and summarised assessed within the Surface Water, Flood Risk and Water Resources chapter. This is considered a credible MA&D scenario, therefore scoped in for further assessment.
Groundwater Flood	Y	The groundwater vulnerability map places the area of the site at Medium-High risk. This risk will be assessed within the Surface Water, Flood Risk and Water Resources chapter and is considered a credible MA&D scenario, therefore scoped in for further assessment.
Other Natural Hazards		
Poor air quality	N	Pollution episodes are known to occur in the UK but the Proposed Development is not expected to be particularly vulnerable this hazard. The development will not contribute significantly to road transport pollution in the area. Air intakes for combustion equipment will be fitted with the appropriate filtration systems to prevent damage from poor air quality. Emissions from combustion equipment will assessed for the purposes of the EIA within the Air Quality assessment and will be controlled and regulated in accordance with an environmental permit. No MA&D scenarios have been identified therefore this category has been screened out for further assessment.
Wildfires	N	Severe wildfires are infrequent in the UK and the Proposed Development is not located in an environment particularly vulnerable to wildfire, being primarily urban/industrial therefore this category has been screened out for further assessment.
Societal Hazards		
Malicious attacks	N	Malicious attack could include intentional violence to people, arson or other methods of destruction of property, cyber-attacks, or chemical, biological, or nuclear attacks by terrorists or other actors. These events have been known to occur at infrastructure sites in the UK. However, these risks will be mitigated at the national level as a matter of national security.