HyGreen Hydrogen Project

Application for an Environmental Impact Assessment Scoping Opinion

Land at 'The Foundry' site, Teesworks and in the vicinity of Wilton International, Lackenby and Grangetown, near Redcar, Teesside

The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 – Regulation 15 ('Scoping opinions of the local planning authority')

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GLOSSARY

Abbreviation	Description
AEP	Annual Exceedance Probability
AIL	Abnormal Indivisible Load
ALARP	As Low As Reasonably Practicable
AOD	Above Ordnance Datum
Applicant	bp Alternative Energy Investments Limited
AQMA	Air Quality Management Area
bgl	Below ground level
BGS	British Geological Survey
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
BS	British Standard
BTO	British Trust for Ornithology
CAA	Civil Aviation Authority
CCPP	Combined Cycle Power Plant (see also CCGT)
CCR	Climate Change Resilience
CCS	Carbon Capture and Storage
CCG	Clinical Commissioning Group
CCGT	Combined Cycle Gas Turbine
CCUS	Carbon Capture, Usage and Storage
CDM	Construction (Design and Management) Regulations 2007
CEMP	Construction Environmental Management Plan
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_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
COMAH	Control of Major Accident Hazards
COPA	Control of Pollution Act 1974
CRTN	Calculation of Road Traffic Noise

Abbreviation	Description
CSM	Conceptual Site Model
COVID-19	Coronavirus
CTMP	Construction Traffic Management Plan
CWTP	Construction Worker Travel Plan
DBA	Desk-Based Assessment
DBEIS	Department for Business, Energy and Industrial Strategy (now DESNZ)
DCO	Development Consent Order
DECC	Department for Energy and Climate Change (from 2016 – 2023 DBEIS)
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DfT	Department for Transport
DLL	District Level Licencing
DMRB	Design Manual for Roads and Bridges
DMW	Demineralised Water
DNA	Deoxyribonucleic Acid
DTM	Digital Terrain Model
EcIA	Ecological Impact Assessment
eDNA	Environmental DNA
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EMS	Environment Management System
EPSM	European Protected Species Mitigation (Licence)
ERIC	Environmental Records Information Centre North-East
ES	Environmental Statement
EU	European Union
EWP	Energy White Paper
FRA	Flood Risk Assessment
GAC	Generic Assessment Criteria
GCN	Great Crested Newt
GHG	Greenhouse Gas
GI	Ground Investigation
GLVIA3	Guidelines for Landscape and Visual Impact Assessment (third edition)
GW	Gigawatt
H_2	Hydrogen (gaseous)
Ha	Hectare
HCA	Homes and Communities Agency
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HPI	Habitats of Principal Importance
HRA	Habitats Regulations Assessment
HSE	Health and Safety Executive
HSI	Habitat Suitability Index

Abbreviation	Description
HV	High Voltage
IAQM	Institute of Air Quality Management
ICCI	In-combination Climate Change Impacts
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 Standards Organisation
JNCC	Joint Nature Conservation Committee
kV	Kilovolt
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LPA	Local Planning Authority
LSOA	Lower layer Super Output Area
LVIA	Landscape and Visual Impact Assessment
MA&Ds	Major Accidents and (Natural) Disasters
MHCLG	Ministry of Housing, Communities and Local Government
MHWS	Mean High Water Springs
MPA	Minerals Planning Authority
MSA	Minerals Safeguarding Area
Mt	Megatonne
MW	Megawatt
NBN	National Biodiversity Network
NCA	National Character Area
NERC Act	Natural Environment and Rural Communities Act (2006)
NGR	National Grid Reference
NH_3	Ammonia
NNR	National Nature Reserve
NO_x	Oxides of Nitrogen
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
NZT	Net Zero Teesside
O_2	Oxygen
ONS	Office for National Statistics
OSGB	Ordnance Survey National Grid
PA 2008	Planning Act 2008
PAH	Polycyclic Aromatic Hydrocarbon
PCC	Power, Capture and Compressor

Abbreviation	Description
PHE	Public Health England, the former name of the UK Health Security Agency
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
PSR	Pipelines Safety Regulations
PWS	Private Water Supply (abstractions)
RCBC	Redcar and Cleveland Borough Council
REC	Redcar Energy Centre
REP	Renewable Energy Plant
RMP	Regeneration Master Plan
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SoCC	Statement of Community Consultation
SoS	Secretary of State
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
SuDS	Sustainable (urban) Drainage System
SPD	Supplementary Planning Document
TA	Transport Assessment
TTWA	Travel to Work Area
TVCA	Tees Valley Combined Authority
UK	United Kingdom
UKCP18	UK Climate Projections 2018
UXO	Unexploded Ordnance
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WHO	World Health Organisation
WPA	Waste Planning Authority
WwTW	Wastewater Treatment Works
ZTV	Zone of Theoretical Visibility

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1.0 INTRODUCTION

Background

1.1.1 AECOM Ltd ('AECOM') has been commissioned by bp Alternative Energy Investments Limited (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 proposed HyGreen Hydrogen Project on land within the administrative boundary of Redcar and Cleveland Borough Council (RCBC) in Teesside (hereafter referred to as the 'Proposed Development Site') (see Figure A-1 in Appendix A).

1.1.2 The HyGreen Hydrogen Project will comprise a main electrolytic green hydrogen production facility (herein referred to as the 'Production Facility'), which will require electricity and water connections as well as a hydrogen pipeline to deliver hydrogen to offsite storage facilities and offtakers who will use the hydrogen in the future (herein referred to as the 'Connection Corridors'). The HyGreen Hydrogen Project (comprising the Production Facility and Connection Corridors) is herein referred to as 'the Proposed Development'.

1.1.3 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 it is proposed do not require formal assessment as part of the EIA.

1.1.4 EIA is an iterative process that feeds into the engineering design process to mitigate significant environmental effects where they are predicted to occur. The final design iteration, along with the findings of the EIA will be reported in an Environmental Statement (ES), in accordance with Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (herein referred to as the 'EIA Regulations').

Consenting Regime

1.1.5 The Proposed Development is for the production of hydrogen by electrolysis to split water molecules (H_2O) into hydrogen gas (H_2) and oxygen (O_2) using electricity produced using renewable power sources. The Production Facility will provide up to 80 MWe (megawatt electrical input) of low-carbon hydrogen production.

1.1.6 The Proposed Development does not fall under Schedule 1 of the EIA Regulations for which EIA would be mandatory, and in its entirety does not fall under Schedule 2 of the EIA Regulations for which EIA may be required. However, it could be considered that the Connection Corridors elements of the Proposed Development fall under one or more of the types of developments described within Schedule 2 of the EIA Regulations:

- 3(b) industrial installations for carrying gas, steam and hot water; and
- 10(k) oil and gas pipeline installations (unless included in Schedule 1 to these Regulations).

1.1.7 Given that the Proposed Development is located in the vicinity of 'sensitive areas' as defined in the EIA Regulations, is over the size threshold in Schedule 2 (in respect of the Connection Corridors), and (unmitigated) could result in significant environmental effects (as outlined in Section 6 of this report), an EIA is proposed to be undertaken in line with the proposals set out in this Scoping Report.

1.1.8 Given that the Connection Corridors are integral to the operation, function, and intended purpose of the Proposed Development as a whole, these should not be separated from the Production Facility for the purposes of considering EIA. Therefore, the Proposed Development in its entirety will be assessed within the EIA.

1.1.9 An ES will be produced and submitted to accompany the planning application for the Proposed Development.

1.1.10 Although not mandatory, submission of the EIA Scoping Report to RCBC commences the EIA process and represents the first notification to RCBC, as the relevant Local Planning Authority (LPA), that the Applicant will undertake an EIA in respect of the Proposed Development and produce an ES to report the findings of the EIA.

Request for an EIA Scoping Opinion

1.1.11 Having determined that an EIA will be undertaken, in accordance with Regulation 15(1) of the EIA Regulations, the Applicant is requesting the LPA's opinion as to the scope and level of detail of the information to be provided in the ES.

Purpose of Scoping

1.1.12 The scoping phase of the EIA process provides a framework for identifying likely significant environmental effects arising from a development and distinguishing the priority issues to be addressed at the assessment stage. This framework assists in focusing the attention (of developers, consultees and decision makers) on key environmental impacts for inclusion and consideration within the EIA. The scoping phase also identifies those matters which do not need to be assessed in detail and therefore can be 'scoped out'.

1.1.13 This EIA Scoping Report has been prepared to facilitate early pre-application engagement with key statutory consultees and stakeholders on the Proposed Development together with the proposed structure, methodology and content of the EIA.

Requirements for Requesting an EIA Scoping Opinion

1.1.14 This EIA Scoping Report has been prepared in accordance with the relevant legislative provisions. Table 1-1 presents a list of information that should be included in a request for an EIA scoping opinion, as prescribed by Regulation 15(2) of the EIA Regulations. The table also includes the location in which that information is provided within this EIA Scoping Report.

1.1.15 The information to be included within the EIA Scoping Report is the same as the information required for an EIA screening opinion request (noting that such a request is not being made for the Proposed Development given it is assumed to be EIA development). The information required for a screening opinion request is prescribed in Regulation 6(2) therefore, where Regulation 6(2) provides further

detail to Regulation 15(2), this has been included as supplementary information in Table 1-1.

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

Description of Information Required for scoping opinion (Regulation 15(2))	Supplementary Descriptions (Regulation 6(2))	Section in EIA Scoping Report where presented
A plan sufficient to identify the land	-	Figure A-1 (Appendix A)
A brief description of the nature and purpose of the development, including its location and technical capacity	a description of the physical characteristics of the development and, where relevant, of demolition works; a description of the location of the development, with particular regard to the environmental sensitivity of geographical areas likely to be affected; and a description of the aspects of the environment likely to be significantly affected by the development	Section 3 Section 2 and Section 6 Section 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 6
Such other information or representations as the person making the request may wish to provide or make	… including any 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 6

The Structure of the Remainder of this Report

1.1.16 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 an overview of any particularly sensitive environmental receptors within the vicinity of the Proposed Development Site;
- Section 3 – The Proposed Development: outlines the key elements of the Proposed Development, the infrastructure to be developed and the function of the operational plant;
- Section 4 – Consideration of Alternatives: provides an overview of the alternatives that have been considered during development of the Proposed Development design (further details will be provided in the ES);
- 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 (EIA) Process: provides an overview of the EIA process and an outline structure for the proposed ES; and
- Section 8 – Summary: provides a summary of the topics to be scoped in and out of the EIA.

2.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

The Proposed Development Site

2.1.1 The Proposed Development Site will be located within the administrative boundary of RCBC. For the purposes of this report, the Proposed Development Site consists of a number of areas corresponding with the different parts of the Proposed Development. These are summarised below and illustrated on Figure A-2, Appendix A.

- Main Site: The Production Facility together with onsite storage and ancillary infrastructure;
- Hydrogen Export Pipeline Corridor: Gaseous phase hydrogen pipeline network for the purpose of facilitating connections to offtakers at various industrial installations and potential future storage sites to the south of the River Tees. Both the individual connections from the pipeline to potential off-takers and storage sites (if used) will be separately consented;
- Electrical Connection Corridor: will connect the Production Facility to the Teesworks private wire electrical network, which will deliver power to the project sourced via green Power Purchase Agreements (PPA) in addition to grid top-up and connection to local renewable solar and low-carbon energy from carbon-capture and storage (CCS) enabled energy-from-waste (EfW) generation projects;
- Water Connection Corridor: Connections are required for water supply and discharge at the Production Facility. The design case at present is connection to local 'raw' water supply, with an option to utilise treated effluent water (grey water) from nearby Bran Sands waste water treatment works (with further treatment by Bran Sands – tailored Effluent Treatment Train or by third-party at the Main Site) for the use in the operation of the Production Facility.

2.1.2 Further information is provided on these elements in Section 3: The Proposed Development.

2.1.3 The Proposed Development Site (all the land within the indicative Planning Application Boundary shown on Figure A-2, Appendix A) encompasses an area of approximately 460 hectares (ha). This boundary represents a worst case at this stage as there is optionality in terms of the final location of the electricity and water connections as well as the hydrogen pipeline. As the design is progressed the land required for the Proposed Development will be subject to appraisal and refinement and the final Planning Application Boundary is expected to be much reduced in area. The final layout that will be incorporated within the proposed Planning Application will be determined through ongoing studies of potential constraints and discussions with relevant stakeholders.

Existing Conditions of the Proposed Development Site

<u>The Main Site</u>

2.1.4 The Main Site comprises land formerly part of the Redcar Steelworks. 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 by the landowner

as part of the decommissioning of Redcar Steelworks, in order to prepare the site for future development (which may include the HyGreen Hydrogen Project). A combination of hardstanding, road networks and railway tracks remain on the Main Site, surrounded by informal vegetation (primarily grass, with occasional shrubs and small trees).

2.1.5 The topography of the Main Site is relatively flat, with typical ground levels between approximately 6 m and 8 m above ordnance datum (AOD).

2.1.6 Historic Ordnance Survey (OS) maps have been studied to determine the previous land uses within the area proposed for the Production Facility.

2.1.7 Prior to the construction of the Redcar steelworks in the 1970s, the Main Site comprised tidal mudflats and marshland identified as Bran Sands within the Tees Estuary. As late as 1965, all but small areas of the north of the Main Site fell below the High Water Mark of Ordinary Tides, with at least one map indicating the presence of a tramway in this area above the tidal zone.

2.1.8 This land was reclaimed during the 1970s to construct the former Redcar Steel Works, believed to be using a mixture of slag imported via railway lines and dredged material from the estuary itself. Extensive development within the Main Site occurred between 1973-79 and 1981-88. The Main Site was primarily used as the Redcar Material Handling Area with structures in the west for ore blending and storage, as well as a coke crushing facility. These structures are known to have included large-scale conveyors, railway lines, lighting towers, and other brick-built buildings likely for welfare and office use. The eastern areas of the Main Site were primarily used for material laydown with some plant, railways, and conveyors to support this.

2.1.9 In October 2015, the then owners of the Redcar Steelworks, Sahaviriya Steel Industries (SSI), went into liquidation, and the steelworks was permanently closed marking the end of almost 170 years of iron and steel making on Teesside.

Current Administrative and Planning Conditions at the Main Site

2.1.10 In February 2016, the UK Government announced plans for the establishment of a new Mayoral Development Corporation (MDC) within the Tees Valley Combined Authority (TVCA). The TVCA was created in April 2016 as a partnership of five local authorities, including RCBC, to work closely with businesses and other partners to provide support to the local economy using devolved powers relating to: infrastructure, skills, business investment, housing, culture and tourism. The purpose of the MDC is to enable greater powers for the development area to be devolved, in areas including regeneration planning and business support.

2.1.11 The South Tees Development Corporation (Establishment) Order 2017 came into force in August 2017 and created the South Tees Development Corporation (STDC). The STDC has been set up to promote economic growth and commercial development in the Tees Valley. The STDC area covers approximately 4,500 acres of land to the south of the River Tees, within RCBC, including the Main Site as well as other industrial assets. STDC acquired the land comprising the Main Site via compulsory purchase order from SSI as of April 2020.

Electrical Connection Corridor

2.1.12 The Point of Interconnection (PoI) substation intended to provide electrical supply to the Proposed Development is one of the existing 66kV substations, operated by Teesworks as part of their private wire network. This could be any of the Corridor, Pellet/Sinter or Kinkerdale substations. These are located approximately 1.2 km to the south-east of the Main Site (for the Corridor and Pellet/Sinter substations) to the west of Dormanstown or approximately 3.9 km south (for the Kinkerdale substation) to the north of Grangetown.

2.1.13 The Electrical Connection Corridor between the Main Site and the substation will follow existing utility connection corridors over former and current industrial land. A combination of hardstanding, road networks and railway tracks cross the Connection Corridor, surrounded by informal vegetation primarily made up of grass, with occasional shrubs and small trees.

Water Connection Corridor

2.1.14 Water supply for the Proposed Development is assumed at this stage to require a short pipeline of around 1.5 km in length from an existing connection point known as valve pit no. 1 (VP1), located to the north-east of the Main Site, in the south-east corner of the neighbouring site of the proposed Net Zero Teesside (NZT) power station. An alternative option of running a new pipeline of approximately 5.5 km in length within established corridors to a supply of demineralised water in Wilton is also being considered as shown in Figure A-2. Effluent discharge for the Proposed Development is assumed at this stage to require a connection to and from the Northumbrian Water Group (NWG) Bran Sands Wastewater Treatment Works (WwTW), located to the south-east of the Main Site. Treated effluent from Bran Sands is also a potential water source option for the Proposed Development. The Water Connection Corridor broadly follows that of the Electrical Connection Corridor, along approximately 1.8 km of existing utility connections between the Main Site and the Bran Sands Wastewater Treatment plant.

2.1.15 Potable water supply options are also available to the north-east of the Proposed Development, in the south-east corner of the proposed Net Zero Teesside (NZT) site, also at VP1. The Proposed Development Site presented in Appendix A (Figure A-2) therefore includes for this potential alternative connection, along approximately 1.4 km of existing utility connections over former and current industrial land between the Main Site and VP1.

Hydrogen Export Pipeline Corridor

2.1.16 The proposed offtakers for the hydrogen produced by the Proposed Development are situated at the Wilton International industrial complex, British Steel's Lackenby Steelworks and in Grangetown. These are all situated in areas of former and current industrial land. Future third-party hydrogen storage facilities are expected to be constructed, including potentially within these areas, but these do not form part of the Proposed Development.

2.1.17 Three options for the hydrogen network connecting the Main Site to the offtakers are proposed at this stage of the Proposed Development. These options initially

follow a broadly similar route to that of the Electrical and Water Connection Corridors to the substation.

2.1.18 Option 1 is an approximately 8.9 km pipeline network, which from Tod Point follows the A1085 Trunk Road north-east to south-west to Grangetown roundabout, and connects from here to the existing service corridors within the Wilton International industrial cluster. This corridor therefore crosses areas of linear informal vegetation at the verges of the road network, before entering into industrial land.

2.1.19 Option 2 is an approximately 9.4 km pipeline network, which from Tod Point crosses the A1085 Trunk Road and the Tees Valley railway line to enter directly into the Wilton International industrial cluster from its northern side.

2.1.20 Option 3 is an approximately 10.0 km pipeline network, which from Tod Point crosses the A1085 Trunk Road and the Tees Valley railway line then diverts eastwards to follow existing service corridors along the eastern boundary of the Wilton International industrial cluster, before entering the Wilton International industrial cluster at the south of its eastern side.

2.1.21 These potential options are considered in this EIA Scoping Report. The viability of each option will be confirmed with the respective landowners at future stages of the design.

Environmental Receptors

Main Site

2.1.22 A number of sensitive environmental receptors have been identified within the vicinity of the Main Site. Each of these are detailed below under their respective environmental discipline (this is not an exhaustive list at this stage). All distances are given as the shortest distance between the receptor and the closest point of the Main Site boundary (see Figure A-2, Appendix A).

2.1.23 Dependent on the type of receptor, appropriate study areas of various distances have been quoted. This is explained in further detail in Section 6 of this Report where the study areas for each assessment are provided.

Residential

2.1.24 The Main Site is generally remote from residential receptors. Marsh Farmhouse is the closest residential receptor, located approximately 1.3 km east of the Main Site, at the western end of Warrenby Industrial Estate.

2.1.25 The nearest settlements to the Main Site include:

- Warrenby (approximately 1.3 km east);
- Dormanstown (approximately 1.9 km south-east)
- Coatham (approximately 2.2 km east); and
- Redcar (approximately 2.2 km east).

Traffic and Transportation

2.1.26 The main route to the Main Site will be via existing industrial access roads on the former steelworks site, which link to a roundabout junction of the A1085 Trunk Road near Dormanstown, between Redcar and the A1053, approximately 1.6 km south-

east of the Main Site. These industrial access roads are single carriageway but are of sufficient scale to accommodate Heavy Goods Vehicles (HGVs) and other road-based plant. From the A1085 Trunk Road roundabout, all roads within the main route are a minimum of two lanes in each direction. This allows access to the A1053 via a roundabout junction with the A1085 Trunk Road approximately 4.0 km south of the Main Site. From here, the A19 can be accessed from either the A66, passing north of Middlesbrough, or the A174, passing to the south.

2.1.27 Internal rail lines associated with the former use of the Main Site as a steelworks run approximately east-west immediately south of the Main Site to/from the Redcar Bulk Terminal.

2.1.28 There are no Public Right of Ways (PRoWs) crossing or immediately adjacent to the Main Site. Whilst the Main Site 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 2014087357[1]) after which date the restriction will be reviewed.

Ecology and Nature Conservation

2.1.29 Within 10 km of the Main Site there are (see Figure A-4, Appendix A):

- Two Special Protection Areas (SPAs):
  - Teesmouth and Cleveland Coast SPA, 315 m to the south of the Main Site; and
  - North York Moors SPA, located approximately 8.2 km south-east of the Main Site.
- One Special Area of Conservation (SAC):
  - North York Moors SAC, located approximately 8.2 km south-east of the Main Site.
- One Ramsar site:
  - Teesmouth and Cleveland Coast Ramsar Site, 380 m to the north-west and 315 m to the south of the Main Site.

2.1.30 There is one Site of Special Scientific Interest (SSSI) within 2 km of the Main Site, that being Teesmouth and Cleveland Coast SSSI, 230 m to the north-west, 610 m to the west and 315 m to the south of the Main Site (see Figure A-4, Appendix A).

2.1.31 There is one National Nature Reserve (NNR) within 2 km of the Main Site, that being Teesmouth NNR, located approximately 1.7 km north-west of the Main Site (see Figure A-4, Appendix A).

[1] https://consult.defra.gov.uk/natural-england/open-access-restriction-at-south-teesdale/results/2014087357_consultation_outcome_review__2021_southteesindest.pdf

2.1.32 There are no Local Nature Reserve (LNR) designations within 2 km of the Main Site. The closest is Seaton Dunes and Common LNR, located approximately 3.0 km north-west of the Main Site (see Figure A-4, Appendix A).

Water Environment and Flood Risk

2.1.33 The Tees Estuary Water Framework Directive (WFD) waterbody (River Tees) is approximately 0.7 km to the west of the Main Site boundary (0.4 km to the north-west of the Main Site boundary at Bran Sands, downstream of the Main Site). The River Tees is tidal at the location, with the normal tidal limit approximately 11.2 km south-west at the Tees Barrage. It is a heavily modified transitional water body of 'Moderate' ecological status and 'Fail' chemical status (see Figure A-5, Appendix A).

2.1.34 The Tees Coastal WFD waterbody (North Sea) is approximately 0.8 km to the north-east of the Main Site. It is a heavily modified coastal water body of 'Moderate' ecological status and 'Fail' chemical status (see Figure A-5, Appendix A).

2.1.35 There are a number of surface water features in the vicinity of the Main Site (see Figure A-5, Appendix A):

- The Dabholm Gut flows to the River Tees approximately 0.8 km south of the Main Site. The Dabholm Gut is tidal and accepts water from:
  - The Tees Estuary (South Bank) WFD waterbody (also known as The Fleet, and flows from Coatham Marsh, to the west of Redcar);
  - The Mill Race (from east of the Wilton International complex); and
  - Dabholm Beck (from the west of the Wilton International complex).

2.1.36 The Bran Sands WwTW (to the immediate south of the Teesworks site) discharges into the Dabholm Gut, as does effluent from the Wilton International complex.

2.1.37 The Environment Agency 'Flood map for planning' indicates that the whole of the Main Site is located within Flood Zone 1 (see Figure A-5, Appendix A), that is defined as, "land having a less than 1 in 1,000 [less than 0.1%] annual probability of river or sea flooding."

Geology and Hydrogeology

2.1.38 The Main Site is underlain by Made Ground overlying superficial tidal flat deposits, glacio-lacustrine deposits and glacial till. These superficial deposits are underlain by bedrock comprising mudstones with sandstone beds from the Triassic Mercia Mudstone Group (underlain at depth by the Triassic Sherwood Sandstone Group) and mudstones of the Triassic Penarth Group in the west of the main site. The east of the Main Site is underlain by the Jurassic Redcar Mudstone Formation. Aquifer designations are described in Section 6. There are no Source Protection Zones (SPZs), Drinking Water Protected Areas, Drinking Water Safeguard Zones (Surface Water and Groundwater) or groundwater, potable water or surface water abstraction licenses within 1 km of the Main Site.

Cultural Heritage

2.1.39 There are no designated heritage assets within the Main Site (see Figure A-6, Appendix A).

2.1.40 There are no scheduled monuments, registered parks and gardens, registered battlefields or world heritage sites within 5 km of the Main Site. The nearest scheduled monument is the 'World War I early warning acoustic mirror 650 m north west of Bridge Farm', approximately 5.4 km south-east of the Main Site, but this will not be directly affected by the construction and operation of the Proposed Development and is too far away for its setting to be affected.

2.1.41 There are three grade II listed buildings within 2 km of the Main Site. All three are associated with The Marsh Farm House and Cottages and their curtilages (outbuildings and a wall) and comprise three listings approximately 1.3 km to the east of the Main Site (see Figure A-6, Appendix A).

2.1.42 Other designations, including conservation areas, are discussed under Section 6 within the Cultural Heritage sub-section of this report.

Landscape

2.1.43 The Main Site is located within the Tees Lowlands National Character Area (NCA).

2.1.44 There are no landscape character designations covering the industrial complexes along the banks of the River Tees, including the Main Site and the surrounding area.

Electrical and Water Connection Corridors

2.1.45 Where environmental receptors in vicinity of the Electrical and Water Connection Corridors differ from those in the vicinity of the Main Site, these are identified below:

Traffic and Transport

2.1.46 The Tees Valley railway line and the A1085 Trunk Road pass through the Water Connection Corridor.

2.1.47 There are three PRoWs within the Electricity and Water Connection Corridors: bridleways 116/9/1, 116/9/2 and 116/10/2. Bridleways 116/9/1 and 116/9/2 form part of the English Coast Path and Teesdale Way long distance route.

Ecology

2.1.48 There are no further SSSI within 2 km of the Electrical and Water Connections Corridors. Lovell Hill Pools SSSI, is located approximately 3.6 km south-east of the Water Connection Corridor.

2.1.49 There are no further NNRs and LNRs within 2 km of the Electrical and Water Connections Corridors. Eston Moor LNR is located approximately 3.6 km south of the Water Connection Corridor; and Errington Wood LNR is located approximately 4.1 km south-east of the Water Connection Corridor.

Water Environment and Flood Risk

2.1.50 In addition to those previously mentioned in the Main Site section, the following named waterbodies and watercourses are within 1 km of the Electrical and Water Connection Corridors: Lackenby Channel; Mains Dike; and Kinkerdale Beck. The following are also within 1 km of the Water Connection Corridor: Cross Beck; Knitting Wife Beck; and Kettle Beck.

Hydrogen Export Pipeline Corridor

2.1.51 As previously described, the Hydrogen Export Pipeline Corridor encompasses the Electrical and Water Connection Corridors and extends further south-east. In addition to the environmental receptors identified in the vicinity of the Electrical and Water Connection Corridors, the following environmental receptors have been identified in the vicinity of the Hydrogen Export Pipeline Corridor:

Residential

2.1.52 Where the Hydrogen Export Pipeline Corridor extends into the Wilton International Estate, it is to the west of Kirkleatham and north of Lazenby villages and north-east of the Grangetown residential area.

Ecology

2.1.53 There are no further SSSI, NNRs or LNRs within 2 km of the Hydrogen Export Pipeline Corridor. Berwick Hills LNR is located approximately 4.7 km west of the Hydrogen Export Pipeline Corridor; and Flatts Lane Woodland Country Park LNR is located approximately 3.8 km south of the Hydrogen Export Pipeline Corridor.

Water Environment and Flood Risk

2.1.54 In addition to those previously mentioned in the Main Site section and Water and Electrical Connection Corridors section, the watercourse named Castle Gill is within 1 km of the Hydrogen Export Pipeline Corridor.

3.0 PROPOSED DEVELOPMENT

Overview

3.1.1 The Proposed Development comprises the construction, operation and maintenance of a 80 MWe low carbon electrolytic hydrogen Production Facility and associated development located in the Teesside industrial cluster area. The Production Facility will be located within land owned by Teesworks known as 'The Foundry' (specifically, Foundry South), hereafter referred to as the 'Main Site' in Redcar on Teesside (Figure A-1, Appendix A).

3.1.2 The Proposed Development will support Teesside's decarbonisation of industry, mobility and heating. The Proposed Development, together with the Applicant's separate Carbon Capture Usage & Storage (CCUS) enabled Hydrogen Production Facility project known as H2Teesside, will create a low-carbon hydrogen hub with potential synergies across the two projects, including utilities, infrastructure, operations, and offtakers, allowing for greater resilience and flexibility.

3.1.3 The HyGreen Hydrogen Project will require a hydrogen pipeline to transport the hydrogen produced in the Production Facility at the Main Site to industrial users around Teesside, as well as other utility connections including for water and electricity. This associated development also forms part of the Proposed Development and is included within the indicative Planning Application Boundary (the Proposed Development Site) presented in Figure A-2, Appendix A.

3.1.4 The Proposed Development's power source will be predominantly green Power Purchase Agreements (PPA) from onshore wind, complemented with direct-wire CCS enabled EfW, direct-wire solar PV and intermittent grid top-up, as required. This complement will have a maximum emissions threshold of 20 gCO_2e/MJHLV of hydrogen in order to comply with low carbon standards (DBEIS, 2021a). The Proposed Development will have a mainly baseload production profile, with demand coming from multiple end uses, including fuel switching within chemical and petrochemical industries, power generation, domestic heating and mobility, amongst others.

3.1.5 At this stage in the design, there are still options being considered for various components of the Proposed Development. Therefore, the Proposed Development and the indicative Planning Application Boundary currently incorporate 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 planning process.

3.1.6 The Rochdale Envelope approach has been adopted to ensure that a worst case in terms of design parameters, 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 ES, and the final Planning Application Boundary used and assessed will be narrowed accordingly.

3.1.7 In addition, some of the design aspects and features of the Proposed Development cannot be confirmed at this early design stage. For example, the building sizes 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.

3.1.8 The power and water supply, new hydrogen distribution network, green hydrogen production via electrolysis, storage facilities, and offtakers are depicted in Figure 3-1, and described in more detail in the sections below. Where possible, a brief description of any optionality still being considered by the Applicant is provided.

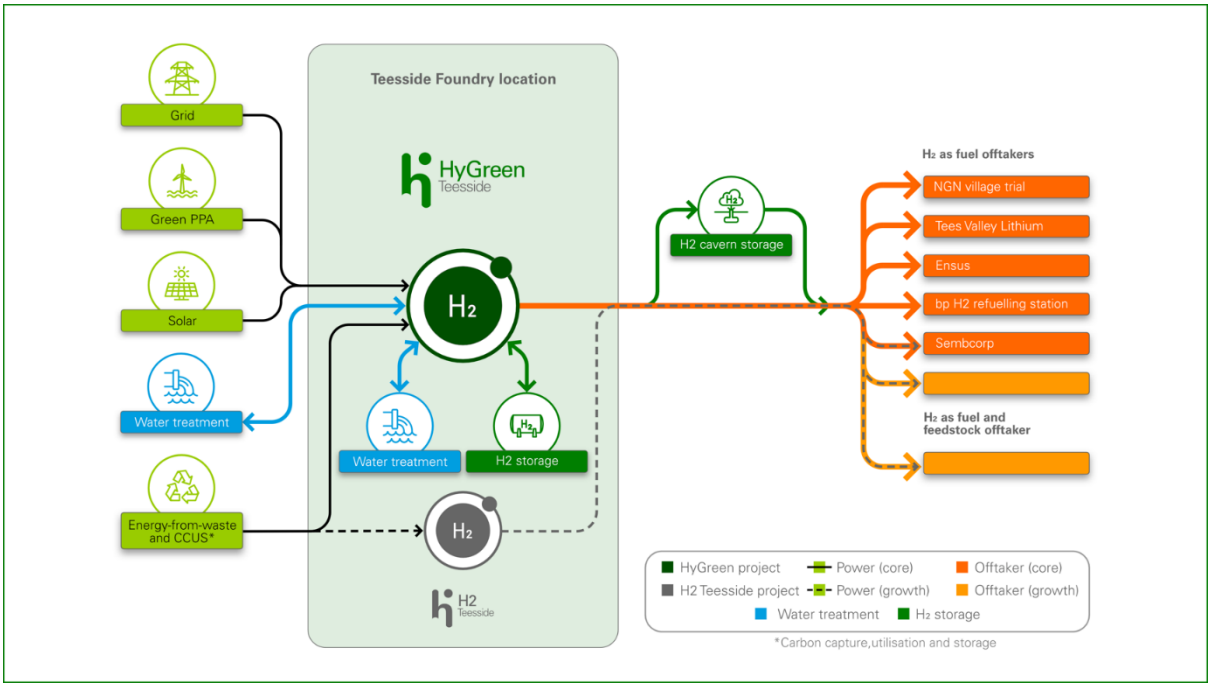

Figure 3-1: HyGreen Project Flow Diagram (NOTE: the 'H2 Cavern Storage' is outside of the scope of the Proposed Development, while the Hydrogen Export Pipeline is within the scope of the Proposed Development up to the point of its connection to the 'H2 Cavern Storage'.)

Production Facility at the Main Site

3.1.9 Green hydrogen production uses electrolysis powered by renewable energy to split water molecules into hydrogen and oxygen. The Proposed Development involves a low-carbon electrolytic hydrogen Production Facility of up to 80 MWe installed electrical capacity. This will either use Anion Exchange Membrane (AEM), Proton Exchange Membrane (PEM), or alkaline electrolysers in low or medium pressure technologies (up to 30 bar). In the AEM electrolyser, the media which transports the anions is a highly concentrated hydroxide solution, in the PEM it is the perfluoro sulfonic membrane, operating at a higher pressure and lower temperatures than the alkaline equivalent.

3.1.10 The core of the facility will be multiple electrolyser modules of 5-20 MWe, supported by common balance of plant (BoP) equipment (systems upstream/downstream of electrolyser modules).

3.1.11 The Applicant is currently considering technologies greater than or equal to Technology Readiness Level 7 (TRL7) at time of delivery/installation (low-temperature AEM/PEM or alkaline technologies at high/low pressure).

Process Summary

3.1.12 The Production Facility will utilise predominantly green PPA from onshore wind, complemented with direct-wire CCS enabled EfW, direct-wire solar PV and intermittent grid top-up to generate hydrogen and oxygen from the electrolysis of water.

3.1.13 Water received via pipeline will be treated to become demineralised (if not already, depending on the source) and to meet an appropriate quality to be supplied to the electrolyser modules, where oxygen and hydrogen separation takes place. Multiple alternative water source options are currently under consideration. Water supply for the Proposed Development is assumed at this stage to require a short pipeline from an existing connection point known as VP1, located to the north-east of the Proposed Development. An alternative option of running a new pipeline within established corridors to a supply of demineralised water in Wilton is also being considered, as well as third option to use treated effluent from nearby Bran Sands WwTW. In the case of alkaline technology only, the electrolysis process also requires a liquid electrolyte, potassium hydroxide solution (~30wt.% potassium hydroxide (KOH)), supply to the electrolyser main unit operations.

3.1.14 Subject to the electrolyser technology, the hydrogen produced by the electrolyser may be at medium pressure (30 bar), or at near atmospheric pressure which would require further compression. Traces of oxygen are removed by catalytic oxidation to form water, which is removed by condensation through driers, together with any water vapor present in the original hydrogen stream. Purified hydrogen in is further metered and delivered into the pipeline. A fraction of the purified hydrogen (4 tonnes) will be further compressed and stored in above ground pressure vessels to balance variation on the production of hydrogen.

3.1.15 Effluents and contaminated rundown from the process will be discharged back to the Bran Sands Wastewater Treatment plant for treatment via the connected waste water line. Additionally, there may be opportunity to discharge treated effluent to the future NZT outfall (to Tees Bay/North Sea) once this is operational but this option does not form part of the Proposed Development at this stage.

3.1.16 Heat generated in the electrolyser modules is removed via cooling systems to ensure temperature control. Waste heat from primary cooling is currently anticipated to be dissipated to atmosphere via air coolers. However, the Applicant is also exploring options for third-party use of the waste heat as the design progresses.

3.1.17 Oxygen produced in the electrolysis process can be safely vented to atmosphere. The Applicant will explore options for third-party use as the design progresses. Oxygen can be recovered, purified, and dried by providing additional equipment irrespective of technology.

3.1.18 Nitrogen gas (N_2) must be available for supply to all relevant units, for safe operation, start-up and shut-down. N_2 will be supplied via an on-site liquid storage facility (refilled periodically via third-party supply using a tanker when required).

Key Components

3.1.19 The Production Facility, dependent on the final technology to be used, is anticipated to include the following components:

- Water treatment and polishing unit – this creates demineralised water (DMW) which is then supplied to the electrolyser modules;
- Electrolyser power supply system, including transformer(s) and rectifier(s);
- Electrolyser modules;
- Hydrogen purification unit – via a process of hydrogen / water separation, oxygen removal, drying and filtration;
- Primary and secondary cooling systems;
- Utility cooling system;
- Air, nitrogen and KOH electrolyte (only required with alkaline electrolysis) systems;
- Vent systems;
- Wastewater collection and treatment;
- Instrumentation/control;
- Fire and gas detection equipment;
- Distributed control system / emergency shutdown system;
- Uninterruptable power supply;
- Piping, racks, and cabling;
- Hydrogen compression (required for storage and transmission);
- On-site above-ground pressurised hydrogen storage;
- On-site hydrogen road tube trailer loading facility;
- Nitrogen liquid storage facility. The nitrogen storage capacity will be enough to enable:
  - One week of normal consumption (continuous analyser purge, continuous hydrogen vent header purge, semi-continuous vessel blanketing); and
  - Storage capacity for one complete start-up purge or storage capacity for one complete shut-down purge, whichever is greater; and
- For alkaline technology a volume of fresh KOH is stored in one tank to allow electrolyser top-up after unexpected maintenance.

3.1.20 An indicative cross-section, including elevations of the main structures is presented in Figure 3-2.

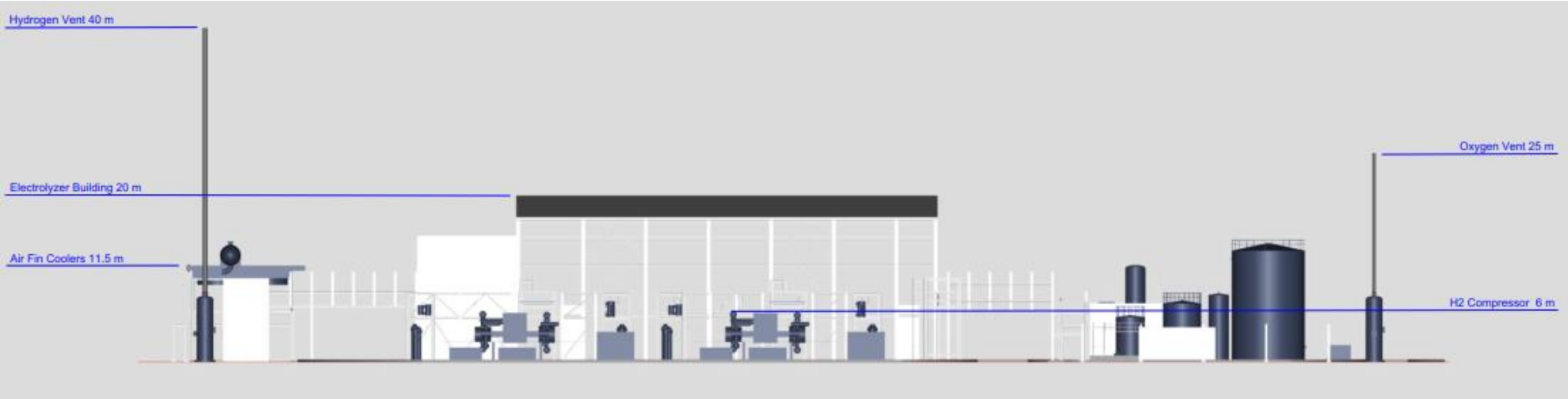

Figure 3-2: HyGreen Indicative Cross-section

Production Capacity

3.1.21 The Production Facility will produce a maximum of 1.5 tonnes/hour of hydrogen gas by electrolysis from 15.3 tonne/hour of demineralised water which requires a nominal 80 MW electrical power at Start of Life (SOL) conditions. Dependant on water source, and requirements for treatment/purification, the total pre-treated water demand is up to 23 tonne/hr.

3.1.22 Due to gradual performance degradation the electrical power consumption is expected to increase at a rate of around 1% per year, until the electrolysers are eventually changed-out or refurnished at End of Life (EOL), the decision-making process and requirements for which is discussed further below in the section on Decommissioning. The utilisation factor of the Production Facility is 80% meaning that the annual delivery capacity will average 10,512 tonne/year hydrogen.

Associated Development

3.1.23 The Production Facility will require import connections for water and electricity, export connections for hydrogen and on-site storage of hydrogen. Off-site third-party storage of hydrogen is also an option being considered by the project, though this would not be within the scope of the Proposed Development. These are described below.

Electrical Connection

3.1.24 The power strategy for the Proposed Development focuses on securing a diverse portfolio of low-carbon power supply meeting the Low Carbon Hydrogen Standard (LCHS), that enables a high overall electrolyser load factor whilst minimising exposure to intermittency of supply.

3.1.25 The green PPA and grid power will be supplied from an existing private-wire 66kV substation at the selected site. The Proposed Development will include electrical infrastructure to integrate direct wire sources, reduce voltages, and supply alternating current (AC) power to the electrolysis modules and other plant.

Water Connections

3.1.26 The following water connections will be required as part of the Proposed Development to supply the Production Facility:

- Primary source water supply, options under consideration include:
  - Raw water via tie-in to existing supply pipeline in the area;
  - Treated industrial effluent from Bran Sands WwTW facility, by new pipeline; and
  - Existing DMW supply, if available locally.
- Towns-water from NWG for potable water and back-up supply, by new pipeline.

3.1.27 The Proposed Development will involve the installation of new water pipelines via existing corridors, as well as primary/secondary water treatment units, tanks, pumps, and drainage. Raw water or NWG treated effluent will be treated on the Main Site in the primary treatment unit, demineralised in the secondary treatment

unit, and collected in a holding tank. DMW will be pumped to the electrolyser modules.

3.1.28 Wastewater from primary/secondary treatment units will be discharged back to the Bran Sands WwTW via the connected waste water line to be provided as part of the Proposed Development for treatment. There is potential for wastewater to be discharged via an outfall to be provided as part of the proposed NZT development, though this is not confirmed and does not form part of the Proposed Development at this stage.

Hydrogen Connections

3.1.29 New hydrogen export pipelines to offtaker interfaces and connections to offsite storage will be required as part of the Proposed Development. The offsite storage itself will not form part of the Proposed Development.

3.1.30 The interfaces between the Proposed Development and the offtakers/offsite storage are to be confirmed during the course of the work, but are expected to be local to each offtaker. The Proposed Development includes for all required infrastructure upstream of each interface and the offtakers/offsite storage provider will provide all the necessary downstream infrastructure.

Other Connections

3.1.31 The Nitrogen liquid storage facility will be refilled periodically via third party supply when required. The Nitrogen liquid storage facility will be located within the Main Site.

3.1.32 For alkaline technology, small volumes of KOH waste from maintenance will be sent offsite for treatment or utilised by other users.

Third Party Infrastructure and Sub-surface Storage

3.1.33 The required connections to third-party infrastructure will be provided by the respective offtakers, downstream of the agreed interface points, which will be situated within an anticipated (up to) 10 km pipeline distance of the Proposed Development. It is currently proposed that the core offtakers for the Proposed Development will comprise of:

- Hydrogen Refuelling Station, Grangetown;
- Northern Gas Networks (NGN), Lackenby – Under NGN's Hydrogen Village Trial Project, NGN will build and operate above ground facilities at Lackenby;
- Peak Rare Earths, Wilton International;
- Ensus Bio-ethanol Plant, Wilton International;
- Sembcorp NG Blending Tie-in, Wilton International; and
- Tees Valley Lithium, Homes England.

3.1.34 The Applicant is in discussion with NGN and Sembcorp to store hydrogen from the Proposed Development in third-party subsurface storage (supplied and consented via third-party infrastructure). This is for additional resilience and flexibility of

hydrogen supply but is not essential for the requirements of the Proposed Development.

3.1.35 The viability of each option will be confirmed with the respective landowners as the design progresses and this will be reflected in the final Planning Application Boundary up to, but not downstream of, the agreed interface points.

3.1.36 The projects of the core offtakers are separate to the Proposed Development and, therefore, will not be assessed as part of the Proposed Development within the EIA. However, these projects will be considered as part of the cumulative assessment, depending on their respective progress and availability of these details at the time the assessment is undertaken.

Construction

Access

3.1.37 Access to the Proposed Development Site during the construction phase for HGV construction traffic is likely to be via the existing access road from the A1085, via the Teesworks entrance. This route will also be used during operation for staff and other site traffic.

3.1.38 Options for transportation of abnormal loads during construction using the local ports are still being considered. The nearest commercial port to the Proposed Development is Teesport, accessing the site via the A1053 and A1085, while the potential to use Redcar Bulk Terminal quay will also be considered. Consideration will be given to the appropriate port and any required Abnormal Indivisible Load (AIL) routes during the design process and assessed accordingly in the ES.

3.1.39 The Main Site will contain construction laydown areas for the construction of the Production Facility and the area of land immediately south of the Main Site may also be used as a temporary construction laydown area as shown in Figure A-2, Appendix A, subject to confirmation of suitability and agreement with landowner. These laydown areas will also be utilised during the construction of sections of the Connection Corridors where they are in close proximity to the Main Site. Construction access routes for the Connection Corridors where they are further from the Main Site are yet to be defined. However, it is assumed that laydown areas will be identified at suitable locations along the Connection Corridors within the indictive Planning Application Boundary shown in Figure A-2, Appendix A.

Site Clearance and Remediation

3.1.40 The Main Site will require site clearance and remediation prior to the construction of the Proposed Development. The Main Site is located within land owned by Teesworks and forms part of the former Redcar Steelworks which is brownfield land. This land currently contains some above and below ground structures and redundant services associated with the former steelworks and earlier development on the site.

3.1.41 It is assumed at this stage that the ongoing removal of those structures, clearance and any remediation of the Main Site 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 complete this work. Remediation works are anticipated to commence in Q3/Q4 2023 and complete in Q1/Q2 2024.

3.1.42 This ES will however include an assessment of the likely significant environmental effects of undertaking these required 'enabling works' by Teesworks in addition to the impacts of the construction of the Proposed Development by the Applicant's contractors. The assessment of 'construction' impacts for scoping in or out of future assessment presented in Section 6 includes these enabling works.

3.1.43 A programme of Ground Investigation (GI) works will be undertaken. The design and extent of these investigations is in progress, expected to be completed during Q1/Q2 2023, and will provide the necessary information to inform the requirements of any future Environmental Permit, the ES as well as the design and layout of the Proposed Development.

3.1.44 This investigation will also inform if changes to site levels are required to facilitate the construction of the Proposed Development.

Construction Programme and Management

3.1.45 Subject to planning permission being granted, it is anticipated that following site clearance and remediation construction will commence in Q1 2024 or the start of Q2 2024, with civils, mechanical and electrical work, and the construction of the hydrogen pipeline and connections for water and electricity. The construction programme is likely to last approximately 18 months – 2 years.

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

3.1.47 The ES will also be supported 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;
- Pollution prevention;
- Dust generation; and
- Waste generation.

3.1.48 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.

3.1.49 All construction works will comply with the Construction (Design and Management) (CDM) Regulations 2015.

Construction Staffing and Traffic Movements

3.1.50 Based on an initial estimate it is considered likely that construction workforce peak numbers will be approximately 770 staff, during the Q1 2025 period.

3.1.51 A peak of approximately 385 two-way traffic movements is currently anticipated during the construction phase, during the Q1 2025 period. These numbers and the associated impacts will be confirmed in the Transport Assessment (TA) and within the Environmental Statement (ES).

Operation

3.1.52 Some elements of the Proposed Development 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.

3.1.53 The HyGreen Hydrogen Project 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.

3.1.54 Any requirements for sampling and analysis of pollutants will be undertaken where required in accordance with the Environmental Permit.

3.1.55 External lighting will be required to ensure the Production Facility can operate safely at all times. The external lighting scheme will be designed in accordance with relevant standards, such as the Guidance Note for the Reduction of Obtrusive Light (2021) published by the Institute of Lighting Engineers and/or by the 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.

3.1.56 During regular operation of the Proposed Development, operational workforce peak numbers in a given 24 hour period will be a maximum of 16 staff. This comprises 15 staff during the day on weekdays, with one member of security staff during the night and on weekends. Additionally, operational site traffic will include hydrogen export by road tube trailer, which will be up to 11 per day. A peak of 54 traffic movements is anticipated during the operation phase. During maintenance periods which are likely to occur approximately every two years, there would be up to 32 people on-site.

Decommissioning

3.1.57 The Production Facility has a planned operational lifespan (design life) of 20 years. At the end of its design life the most likely scenario would be that the Proposed Development would be shut down, all above ground structures removed and remediated as required to facilitate future re-use. The same timescales would apply for the hydrogen pipelines and connections. However, it is expected that the Proposed Development will have some residual life remaining and an investment decision would then be made based on market conditions prevailing at the time. If

the operating life were to be extended beyond its original intended design life for any reason, the design of the Proposed Development would be updated in line with legislative requirements at the time.

3.1.58 If decommissioning were to take place in future, a Decommissioning Plan (including Decommissioning Environmental Management Plan) would be produced and agreed with the Environment Agency as part of the Environmental Permitting and site surrender process. The Decommissioning Environmental Management Plan would consider in detail all potential environmental risks on the Proposed Development Site (including any aspects of the Proposed Development not covered by the Environmental Permit) and contain guidance on how risks can be removed or mitigated.

3.1.59 Therefore, decommissioning is proposed to be scoped out of consideration within the EIA and is not discussed within the remainder of this Scoping Report.

4.0 CONSIDERATION OF ALTERNATIVES

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, including a comparison of the likely significant environmental effects of each alternative.

The Do Nothing Alternative

4.1.2 The 'Do Nothing' alternative would be where the Proposed Development would not be developed, meaning that the opportunity for industrial offtakers to transition to utilising hydrogen piped directly to their facilities would not be readily available and they may continue to use or opt for more carbon intensive alternatives.

4.1.3 The Proposed Development will help 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 the ES.

Site and Design Alternatives

4.1.4 The Applicant, based on the site selection process and the information and data which is emerging to inform these decisions, is progressing concept design for the Main Site as identified in this report.

4.1.5 For the Proposed Development, a range of alternative development sites have been identified and assessed, with the Main Site identified in this document being the recommended option. Various factors, including site suitability, connection distances and pathways, supply capacities, and environmental impacts have influenced the site selection process which will be set out in the ES for the Proposed Development.

4.1.6 It is proposed that other project alternatives will be considered, and options refined prior to the planning application being submitted, including (but not limited to):

- the layout of the Proposed Development on the Main Site including the configuration of the structures and buildings within it;
- the design of the Proposed Development, for example options are still being considered in terms of where the water input is to be sourced from and how effluents and contaminated rundown from the process will be managed;
- the numbers of people and vehicles required for the Proposed Development may change as the design develops; and
- the options and refinement of routes for the hydrogen pipeline and the electrical and water connections within the corridors shown in Figure A-2, Appendix A.

4.1.7 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.

5.0 PLANNING POLICY AND NEED

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

5.1.2 Section 70(2) of the Town and Country Planning Act 1990 (the 'TCPA') states that:

"(2) In dealing with an application for planning permission … the authority [the LPA] *shall have regard to–*

the provisions of the development plan, so far as material to the application, …

I any other material considerations."

5.1.3 The development plan for the Proposed Development comprises the Redcar & Cleveland Local Plan and Policies Map (adopted May 2018) and the Tees Valley Joint Minerals and Waste Development Plan Documents ('DPDs') (adopted September 2011).

5.1.4 The National Planning Policy Framework (July 2021) is a material consideration to be taken into account in the determination of applications for planning permission. The following policy is also considered to be material and relevant to the Proposed Development:

- National Policy Statements for Energy; and
- Government Energy and Climate Change Policy.

5.1.5 The development plan, the National Planning Policy Framework (NPPF) and material and relevant National Policy Statements for Energy and recent energy and climate change policy are considered below.

5.1.6 The application for planning permission 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.

Local Planning Policy

<u>Development Plan Documents</u>

5.1.7 The site for the Proposed Development is located entirely within the administrative boundary of RCBC, the LPA which will be responsible for determining the application for planning permission.

5.1.8 The preferred location for the Production Facility is the Foundry Site, within the STDC Teesworks Site, which encompasses the former Redcar Steel Works Site.

5.1.9 The Hydrogen Export Pipeline, Water and Electrical Connection Corridors for the Proposed Development encompass land to the east of the Main Site and to the south around and within the Wilton International Site.

5.1.10 The relevant development plan documents ('DPDs') are therefore as follows:

- The Redcar & Cleveland Local Plan and Policies Map (adopted May 2018); and
- The Tees Valley Joint Minerals and Waste DPDs (adopted September 2011).

5.1.11 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, Stockton-on-Tees Borough Council (STBC), Hartlepool Borough Council (HBC) and Darlington and Middlesbrough Councils. The Joint Minerals and Waste DPD is of limited relevance to the Proposed Development.

5.1.12 As stated above, parts of the Proposed Development lie within the boundary of the STDC Teesworks Site. 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.

5.1.13 STDC has produced a Master Plan (the 'South Tees Regeneration Master Plan') to provide a flexible framework for the regeneration of the Teesworks Site. The Master Plan was prepared throughout 2017 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. The Master Plan has no formal planning status, however, the South Tees Area SPD is a material planning consideration.

Planning Allocations/Designations

5.1.14 The key planning allocations/designation and related policies, based upon the Policies Map of the Local Plan, which apply to the Proposed Development are listed below:

- Development Limits – Policy SD3;
- 30 km wind farm safeguarding area for Durham Tees Valley Airport – Policy SD6;
- Protected Employment Area – Policy ED6;
- STDC Area – Policy LS4;
- Sensitive Landscape Areas – Policy N1;
- Restoration Landscape Areas – Policy N1;
- Green Wedges and Strategic Landscape Areas – Policy N2;
- Primary Open Spaces – Policy N3;
- SSSIs – Policy N4;
- Teesmouth and Cleveland Coast SPA 6km Buffer Zone/Ramsar Site and Teesmouth and Cleveland Coast SSSI – Policy N4;
- Safeguarding of Mineral Resources from Sterilisation – Policy MWC4;
- General Location for Large Waste Management Facilities – Policy MWC8; and
- Sewage Treatment – Policy MWC9.

5.1.15 The South Tees SPD was also adopted in May 2018. Figure 2 of the SPD shows indicative areas for key industries and processes. The Teesworks Site is identified for manufacturing and energy.

5.1.16 The South Tees SPD sets out a number of 'Development Principles' to guide the development of the Teesworks Site/South Tees Area. 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. Paragraph 3.49 encourages the provision, not only of nationally significant energy projects within the South Tees Area, but also on-site energy generation that is capable of meeting the needs of the planning development zones and regenerated land.

5.1.17 Section 4 of the SPD sets out site specific development principles for the five main zones of the South Tees Area. These are the North Industrial Zone; North East Industrial Zone; Central Industrial Zone; South Industrial Zone; and Coastal Community Zone (Figure 6: Development Zones – page 48). The North Industrial Zone, which encompasses the Main Site, 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.

Relevant Development Plan Policies and SPD Development Principles

5.1.18 A summary of the development plan policies and SPD development principles considered to be of relevance to the Proposed Development is provided in Table 5-1 below:

Table 5-1: Development Plan Policies and SPD Development Principles

Policy	Policy Summary
SD1 – Sustainable Development	When considering development proposals, the Council will take a positive approach reflecting the presumption in favour of sustainable development within the NPPF. Developments should improve the economic, social and environmental conditions of the area. Planning proposals that accord with the policies of the Local Plan will be approved without delay unless materials considerations indicate otherwise.
SD2 – Locational Policy	Development will be directed to the most sustainable locations in the Borough. The majority of development will be focused in the urban and coastal areas. Priority will be given to brownfield land in sustainable locations that is not of high environmental value. Wherever possible, priority will be given to the development of brownfield land in sustainable locations, providing it is not of high environmental value, the reuse of existing buildings and limiting development in the countryside. For all development proposals, regard will need to be made to other policies in the Local Plan, in particular those that safeguard land and/or buildings for nature and heritage conservation, and leisure uses. An Appropriate Assessment will be required for all development that, either alone, or in combination with other plans or developments, is likely to have a significant effect on any Natura 2000 site. Development within 6km of the Teesmouth and Cleveland Coast SPA, which would result in increased recreational disturbance of the site's interest features,

Policy	Policy Summary
	will be expected to contribute towards mitigation measures identified in the Recreation Management Plan, unless other appropriate mitigation is provided. Mitigation may also be required for other schemes where significant effects on any Natura 2000 site are identified, regardless of location.
SD3 – Development Limits	Within development limits, development will be supported, subject to meeting other policies in the Local Plan. Development beyond development limits will be to specific circumstances such as where the development requires a countryside location due to technical or operational reasons or it involves the redevelopment of brownfield land that is not of high environmental value.
SD4 – General Development Principles	In assessing the suitability of a site or location, development will be permitted where it meets the requirements of the Locational Policy (Policy SD2) and will not have a significant adverse effect on amenity or occupiers; result in unacceptable loss or significant adverse effect on the environment; avoids locations that put the environment or human health or safety at unacceptable; will not increase flood risk either on site or downstream of the development; or result in adverse effects on nature conservation sites, amongst other matters. Development proposals will be expected to make the most effective and efficient use of land; be in character with its surroundings and incorporate high quality design and access.
SD5 – Developer Contributions	Subject to economic viability, the Council may secure developer contributions in order to fund necessary infrastructure and other community benefits. These will normally be secured through planning obligations. Planning obligations will be sought where it is not possible to mitigate the impacts of a development through the use of planning conditions and where the contributions are fair, reasonable, directly related to the development and necessary to make the development acceptable in planning terms.
SD6 – Renewable and Low Carbon Energy	Renewable and low carbon energy schemes will be supported and encouraged, and will be approved where their impact is, or can be made, acceptable. The Council will support appropriate schemes for wind and solar energy where they are located within the South Tees and Wilton industrial area and other potentially suitable areas as identified on the Policies Map. In determining applications for renewable and low carbon energy and associated infrastructure matters that will be taken into account include the scale of the development, impact on residential amenity, environmental impacts, the sensitivity of the landscape, airport and military considerations and the cumulative impact of proposals, amongst other matters.
SD7 – Flood and Water Management	Development in areas at risk of flooding will only be granted where it meets the sequential and exception tests, will be safe and does not increase flood risk elsewhere. A Flood Risk Assessment (FRA) will be required for development in Flood Zone 1 on sites of 1 ha or more and for development in Flood Zones 2 and 3. Development will be expected to be designed to mitigate and adapt to climate change; prioritise the use of sustainable urban drainage systems; ensure the separation of foul and surface water flows; and improve water quality where possible, as well as maintaining and enhancing the biodiversity and habitat of watercourses.

Policy	Policy Summary
ED6 – Promoting Economic Growth	Policy ED6 confirms that land and buildings within existing employment areas shown on the Policies Map will continue to be developed and safeguarded for employment uses. It goes onto state that specialist uses, including energy and heavy processing industries and port logistics will be focused in the South Tees Area, Wilton International and Skinningrove. In these areas proposals falling within Use Classes B1, B2, B8 and suitable employment related sui generis uses will be supported. Proposals will need to demonstrate that there will be no adverse effects on the integrity of the nearby protected nature conservation sites. Proposals will be encouraged to improve the quality of the environment, signage, security and accessibility of sites.
LS4 – South Tees Spatial Strategy	The South Tees Spatial Strategy includes the STDC area, Wilton International, Teesport and the South Tees Industrial Estates and Business Parks. The Policy aims to support the delivery of significant economic growth and job opportunities in this area, including encouraging clean and efficient industry to help reduce carbon emissions; the development of Carbon Capture and Storage to decarbonise the local economy; and the development of the chemical, technology and energy production industries at Wilton International. The Policy also seeks to improve the environmental quality of the area and to protect the nearby nature conservation sites, including the Teesmouth and Cleveland Coast SPA and Ramsar site and improve biodiversity interest of sites.
N1 – Landscape	Policy N1 seeks to protect and enhance the Borough's landscapes. Development proposals will be considered within the context of the Landscape Character Assessment, the Landscape Character SPD and the Historic Landscape Characterisation. Proposals will not be permitted where they would lead to the loss of features important to the character of the landscape, its quality and distinctiveness, unless its benefits clearly outweigh landscape considerations.
N2 – Green Infrastructure	The Council will aim to protect and enhance the green infrastructure network. Opportunities to incorporate green infrastructure into development proposals should be sought. Green infrastructure includes strategic green infrastructure corridors, strategic gaps, green wedges, open spaces, strategic landscape areas, heritage assets, public rights of way and beck valleys and watercourses. Where there is a loss of green infrastructure the principle of 'net gain' should apply.
N3 – Open Space and Recreation	Seeks to protect open space and recreation facilities from development.
N4 – Biodiversity and Geological Conservation	Policy N4 seeks to protect and enhance the Borough's biodiversity and geological resources. Development should avoid detrimental impacts on biodiversity and geodiversity whether individual or cumulative. Where this is not possible mitigation, or compensation must be provided. Development proposals will be considered in accordance with the status of biodiversity and geodiversity sites within the hierarchy. Priority will be given to the protection of internationally important sites such as the Teesmouth and Cleveland Coast SPA and Ramsar site and the North York Moors SPA and SAC. Development that is not directly related to the management of such sites and which is likely to have a significant effect upon them will be subject to an Appropriate Assessment. Within the

Policy	Policy Summary
	6km buffer zone of the Teesmouth and Cleveland Coast SPA and Ramsar Site, proposals that would result in a net increase in residential units, or other development that would lead to increased recreational disturbance of the site's interest features, will be expected to contribute towards strategic mitigation measures identified in the Recreation Management Plan. This is to ensure that adverse effects on the site's integrity can be avoided. Development that will have an adverse impact on nationally important sites such as SSSI will not be allowed unless the benefits of the development outweigh the impacts; no reasonable alternatives are available; and mitigation, or where necessary compensation, is provided for the impact. The Policy also seek to safeguard locally important nature conservation sites. Wherever possible, development should provide 'net gains' in the value of biodiversity.
HE2 – Heritage Assets	Seeks to protect designated heritage assets and their settings as well as non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments.
TA1 – Transport and New development	The Council and its partners will ensure that the transport requirements of new development, commensurate to the scale and type of development, are taken into account and seek to promote sustainable travel to minimise environmental impacts and support residents' health and wellbeing. The Council will support the preparation and implementation of travel plans, travel assessments and other mechanisms to encourage the use of sustainable transport modes.
STDC 1 – Regeneration Priorities	The Council in partnership with STDC will seek to achieve the comprehensive development of the South Tees Area in order to realise an exemplar world class industrial business park. This will include prioritising uses connected with advanced manufacturing and new technologies; promoting and supporting uses and infrastructure connected to a low carbon economy; focusing on high-skilled employment opportunities; protecting heritage assets; improving connectivity and environmental quality. Piecemeal development will be resisted.
STDC4 – Economic Development Strategy	The Council in partnership with STDC will support economic development of the South Tees Area for specialist industries and other industries which would benefit from a location in this area in accordance with Local Plan Policies ED6 and LS4.
STDC6 – Energy Innovation	The Council in partnership with STDC will promote and support the development of new energy generation in the South Tees Area, including renewable energy development and the promotion of other innovative energy projects. All energy generation should be appropriately sited and designed in order to avoid unacceptable adverse environmental or amenity impacts.
STDC7 – Natural Environmental Protection and Enhancement	Seeks to protect and, where appropriate, enhance designated and non-designated sites of biodiversity and geodiversity interest and value. All development proposals will be required to comply with Local Plan Policy N4 which seeks to protect the internationally and national designated nature conservation sites within the area. The provision of green infrastructure will be supported in accordance with Local Plan Policy N2. Proposals will be required to have regard to forthcoming biodiversity and open space strategies.

Policy	Policy Summary
STDC8 – Preserving Heritage Assets	The Council in partnership with STDC will seek to identify those industrial assets which it is appropriate and viable to retain as part of the development of an industrial heritage trail. Development proposals that will affect a designated or non-designated heritage asset or its setting should be in accordance with Local Plan Policy HE2.
STDC10 – Utilities	The development of new infrastructure relating to energy generation will be supported, including power generation facilities utilising both conventional and renewable resources and Carbon Capture and Storage ('CCS').
STDC11 – North Industrial Zone	Will encourage development proposals relating to port related industry, major space users/large scale manufacturing, energy innovation, power generation and storage, bulk materials and mineral processing. The potential for an open space recreation and heritage area within the North Industrial Zone ('NIZ') and incorporating the Redcar Blast Furnace is being explored. Development proposals should be in accordance with Local Plan Policy N4 and the requirements of the forthcoming biodiversity strategy, which will consider the need for a buffer zone to protect the existing environmental assets within and adjacent to the North Industrial Zone. Proposals should also take account of flood risk in accordance with Local Plan Policy SD7.
STDC12 – North East Industrial Zone	Will encourage development proposals relating to advanced manufacturing, research and development, testing and laboratory services and industrial and technology training. Proposals should accord with Local Plan Policies N4 and SD7.
MWC4 – Safeguarding of Mineral Resources from Sterilisation	Within minerals safeguarding areas (MSAs), non-minerals development will only be permitted if it would not sterilise or prejudice future extraction of the resource; the mineral will be extracted prior to development; or the need for the development outweighs the need for the mineral resource.
MW8 – General Locations for Waste Management Sites	Allocations and development proposals for large waste management facilities should be located in areas such as south of the River Tees (e.g. around Teesport). In determining the suitability of sites within such areas, consideration will be given to the potential impact of the protected nature conservation sites.
MWC9 – Sewage Treatment	Development involving the extension or upgrade of the existing sewage treatment facilities including at Bran Sands will be supported. All proposals for additional sewage treatment facilities should be supported by evidence that will not create any significant adverse effects from odour, visual impact, or on ecology or water quality.

5.1.19 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 planning permission.

National Planning Policy Framework

5.1.20 The NPPF, 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. The NPPF is supported by the Planning Practice Guidance (PPG), which provides more detailed guidance on various aspects of planning.

5.1.21 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.

5.1.22 Central to the NPPF 's 'a 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.

5.1.23 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"*.

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

"The planning system should support the transition to a low carbon future in a changing climate … it should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure". [underlining added]

5.1.25 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.

5.1.26 NPPF policies of particular relevance to the Proposed Development 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.

5.1.27 A summary of those policies is provided in Table 5-2 below.

Table 5-2: Relevant NPPF 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 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 Greenhouse Gas (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 located 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.

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

5.1.29 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.

National Policy Statements for Energy

5.1.30 Under the Planning Act 2008 (the 'PA 2008') regime, the policy framework for examining and determining NSIPs is provided by National Policy Statement ('NPSs').

5.1.31 A number of NPSs have been designated in relation to energy infrastructure. This includes the 'Overarching NPS for Energy (EN-1)'.

5.1.32 While the Proposed Development is not a type of infrastructure listed at Section 14 of the PA 2008, so as to constitute a NSIP, in clarifying the role of the energy NPSs in the planning system, EN-1 states (Paragraph 1.2.1):

"In England and Wales this NPS is likely to be a material consideration in decision making on applications that fall under the Town and Country Planning Act 1990 (as amended)."

5.1.33 The energy NPSs considered to be material and relevant to the Proposed Development are therefore considered below.

Current Energy NPSs

5.1.34 The current energy NPSs were published in July 2011 by the Secretary of State (SoS) for the Department for Energy and Climate Change (now Department for Energy Security and Net Zero (DESNZ)). 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);
- The NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4); and
- The NPS for Electricity Networks Infrastructure (EN-5).

5.1.35 Part 3 of EN-1 'The need for new nationally significant energy infrastructure projects' defines and sets out the 'need' for nationally significant energy infrastructure. Paragraph 3.1.1 states that the UK needs all types of energy infrastructure covered by the NPS in order to achieve energy security at the same time as dramatically reducing 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.

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

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

5.1.38 Part 4 of EN-1 sets out a number of 'assessment principles' that must be taken into account by applicants and the SoS in preparing and determining applications for nationally significant energy infrastructure. General points include (Paragraph 4.1.2) the requirement for the SoS, given the level and urgency of need for the

infrastructure covered by the energy NPSs, to start with a presumption in favour of granting consent for applications for energy NSIPs. This presumption applies unless any more specific and relevant policies set out in the relevant NPS clearly indicate that consent should be refused or any of the considerations referred to in Section 104 of the PA 2008 (noted above) apply.

5.1.39 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; climate change adaptation; pollution control and environmental regulatory regimes; safety; hazardous substances; health; common law and statutory nuisance and security, amongst others.

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

5.1.41 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 taken into account in the preparation and assessment of applications for gas pipelines and electricity network infrastructure, including relevant environmental matters.

Draft Revised NPSs

5.1.42 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 emission by 2050. As yet, no date has been set for the designation of the revised energy NPSs. While the current suite of NPSs for energy infrastructure remain relevant Government policy and have effect for NSIP applications for the purposes of the PA 2008, it is considered that the draft revised NPSs are material and relevant to the Proposed Development. The following draft revised NPSs are considered to be relevant:

- Draft Overarching National Policy Statement for Energy (EN-1);
- Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4); and
- Draft National Policy Statement for Electricity Networks Infrastructure (EN-5).

5.1.43 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."

5.1.44 Draft revised EN-1 includes new policy in relation to hydrogen 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"*.

Energy and Climate Change Policy

5.1.45 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 low carbon hydrogen has to play in achieving this transition is confirmed by recent energy and climate change policy including:

- The Ten Point Plan for a Green Industrial Revolution (November 2020);
- The Energy White Paper (EWP) (December 2020);
- Industrial Decarbonisation Strategy (March 2021);
- UK Hydrogen Strategy (August 2021);
- Net Zero Strategy: Build Back Greener (October 2021); and
- British Energy Security Strategy (April 2022).

5.1.46 These policy documents are considered below.

<u>The Ten Point Plan for a Green Industrial Revolution (November 2020)</u>

5.1.47 '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.

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

"We will generate new clean power with offshore wind farms, nuclear plants <u>and by investing up to half a billion pounds in new hydrogen technologies</u>. 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 CO_2e) between 2023 and 2032, equal to taking all of today's cars off the road for around two years…."

5.1.49 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."

5.1.50 It highlights how 5 Gigawatts (GW) of low carbon hydrogen 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.

5.1.51 The Proposed Development will help deliver the Ten Point Plan by delivering low carbon hydrogen production at scale on Teesside.

<u>The Energy White Paper (EWP) (December 2020)</u>

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

5.1.53 The Government estimates (Introduction, page 15) that the measures in the EWP could reduce emissions across power, industry and buildings by up to 230Mt CO_2 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.

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

"Support a Green Recovery from COVID-19 …

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

- *Working with industry, aiming to develop 5GW of low-carbon hydrogen production capacity by 2030."*

5.1.55 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).

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

5.1.57 "…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."*

5.1.58 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_2 e of emissions (2018 figures).

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

5.1.60 In order 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."

5.1.61 The EWP notes (page 124) that many clusters are located 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 hydrogen, will be crucial to enhancing local economic growth and creating jobs together with prosperity.

5.1.62 Chapter 5 of the EWP includes a section on 'Clean Hydrogen' (pages 127 to 128). It identifies that hydrogen will be critical in reducing emissions from heavy industry, as well as in power, heat and transport. Clean hydrogen includes using natural gas and

capturing the CO_2 by-product with CCUS or using renewable electricity to split water into hydrogen and oxygen. It includes commitments to:

- Work with industry to develop 5GW of low-carbon hydrogen production capacity by 2030.
- Create a Net Zero Hydrogen Fund to support low-carbon hydrogen production, providing £240 million of capital co-investment out to 2024/25.

5.1.63 The EWP underlines (page 128) that a variety of hydrogen production technologies will be required to satisfy the level of anticipated demand for clean hydrogen by 2050 and that the Government hopes to see 1GW of hydrogen production capacity by 2025 on route to its 2030 goal.

5.1.64 The Proposed Development is clearly consistent with commitments in the EWP to deliver low carbon hydrogen production at scale within one (Teesside) of the UK's major industrial clusters.

Industrial Decarbonisation Strategy (March 2021)

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

5.1.66 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 hydrogen.

5.1.67 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 a significant switching to low carbon fuels such as hydrogen 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 hydrogen networks where there is a sharing of benefits and the risk or cost is too great for the private sector.

5.1.68 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 low carbon hydrogen 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."

5.1.69 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 hydrogen economy in the UK. The Government sees it as critical to demonstrate fuel switching to hydrogen in industrial sites in parallel to ramping up low carbon hydrogen production.

5.1.70 The Proposed Development will make a significant contribution to industrial decarbonisation in the UK through the production of and supply of low carbon hydrogen to a number of industrial offtakers on Teesside.

UK Hydrogen Strategy (August 2021)

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

5.1.72 Chapter 1 'The case for low carbon hydrogen' confirms that low carbon hydrogen 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. Hydrogen 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."

5.1.73 Section 1.3 of Chapter 1 'The UK's hydrogen opportunity' sets out the Government's 'twin track' approach to hydrogen 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 hydrogen production (page 10). It goes onto state (Page 10):

"… 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."

5.1.74 Figure 1.3 at Chapter 1 of the Strategy identifies Teesside as a location for both green and blue hydrogen production (page 11).

5.1.75 The Strategy considers the 'Use of hydrogen in industry' (pages 52 and 53) stating that:

"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."

5.1.76 It is relevant to note that since the UK Hydrogen Strategy was published, the British Energy Security Strategy (April 2022) has doubled the UK's hydrogen production ambition from 5GW to 10GW by 2030. This is reflected in the latest 'Hydrogen Strategy update to the market' issued by BEIS in (December 2022), which states that at least half of that hydrogen should be from 'electrolytic' (green) hydrogen.

Net Zero Strategy: Build Back Greener (October 2021)

5.1.77 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.

5.1.78 With regard to 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 hydrogen (page 19).

5.1.79 For industry, the Net Strategy states (page 21) that it will deliver four CCUS clusters, capturing 20-30 Mt CO_2 across the economy, including 6 Mt CO_2 of industrial emissions, per year by 2030. This will be done by supporting industry to switch to cleaner fuels, such as low carbon hydrogen 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 hydrogen and industrial carbon capture business models. This is in addition to £240 million Net Zero Hydrogen Fund.

5.1.80 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)

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

5.1.82 Notably, the British Energy Security Strategy identifies the importance of low carbon hydrogen, with an increased commitment to achieve up to 10GW of hydrogen production by 2030.

6.0 POTENTIALLY SIGNIFICANT ENVIRONMENTAL EFFECTS

6.1.1 The following sections discuss the potential environmental impacts associated with the Proposed Development which are subsequently proposed to be considered as part of the EIA. The methodology and assessment criteria that will be used to assess the potential significance of identified effects are also outlined at a high-level appropriate to the current stage of design, alongside potential mitigation measures for implementation following assessment.

Surface Water, Flood Risk and Water Resources

Baseline Conditions

Study Area

6.1.2 A general study area of 1 km from the Proposed Development Site has been considered in order to identify water bodies that are hydrologically connected to the Proposed Development Site and have the potential to be directly impacted by the activities associated with the Proposed Development. Given that watercourses flow and water quality and flood risk impacts may propagate downstream, where relevant the assessment also considers a wider study area to as far downstream as a potential impact may influence the quality or quantity of the water body. In this case, watercourses across the study area drain towards the River Tees and onto the North Sea at Tees Bay. As such, the North Sea at Tees Bay is considered the final receiving waterbody that could conceivably be affected.

Topography, Land-Use and Climate

6.1.3 The Main Site is characterised by the flat, low-lying coastal topography, between 6-8 m AOD (Ordnance Survey mapping, 2022). 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 (MET Office, 2022).

Surface Waterbodies and Features

6.1.4 Surface waterbodies that are WFD designated close to the Proposed Development Site include the Tees (transitional waterbody), Tees Coastal (coastal waterbody), and Tees Estuary (South Bank) (a freshwater fluvial waterbody).

6.1.5 Each of the surface waterbodies is classified as being of Moderate Ecological Status (Environment Agency, 2019), and failing to meet Good chemical status due to elevated levels of various priority substances. Refer to Table 6-1 for further details.

6.1.6 North-east of the Proposed Development Site is Coatham Sands, which is a designated bathing water (as 'Redcar Coatham'). The Environment Agency's Bathing Water Quality website notes that the Redcar Coatham bathing water is classified as 'Excellent' based on samples collected between 2018 and 2022.

6.1.7 In addition to the Tees Coastal waterbody and the Tees Transitional waterbody, the Proposed Development interacts with nine named watercourses within the Tees

Lower and Estuary Operational WFD Catchment (Ordnance Survey mapping, 2022). Provisional baseline information with regard to all identified watercourses in the study area is provided in Table 6-1, below. Within Coatham Sands there is also a small, isolated, artificial pond.

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

Water Feature	Initial 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 88.31 km^2.
Tees Transitional Water Body/ Seaton on Tees Channel Delta	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 Fleet/ Tees Estuary (S 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.
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.
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 watercourses at NGR NZ 57893 22824, then flows north of the Wilton International Site beneath the A1085. It remerges 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. Northumberland 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. Mains 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.
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

Water Feature	Initial Baseline Description
	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.
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 not clear from online mapping north of the A1085 as the watercourse is culverted.
Cross Beck	Cross Beck rises on Eston Moor at NZ 55920 17053. It flows generally north to become Knitting Wife Beck at NZ 55172 20910 in Grangetown. The watercourse is upstream of any works relating to the Proposed Development and so can be scoped out of further assessment.
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

6.1.8 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 RCBC to inform the baseline.

6.1.9 The closest Nitrate Vulnerable Zone (NVZ) is approximately 7.6 km west of the Proposed Development and thus will not be impacted. 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 7 km north-west of the Proposed Development Site and will not be impacted from the development.

6.1.10 The Teesmouth and Cleveland Coast SPA is a catchment where future development must be nutrient neutral. The area of most concern is Seal Sands, on the northern side close to the mouth of the estuary. In this shallow bay area excess nutrients are causing the excessive growth of algae mats across the sand and mudflats which prevents coastal birds (for which the SPA is designated) from feeding.

6.1.11 The nutrient neutrality restrictions means that new developments that may release new sources of excess nutrients (in this case nitrogen) need to ensure that they offset

this load so that the net effect is no increase in nutrients reaching the Teesmouth and Cleveland Coast SPA.

6.1.12 The Northumbrian Water Brand Sands WwTW (approximately 0.3 km south of the Main Site) discharges into the Dabholm Gut, as does effluent from the Wilton International complex.

Designated Nature Conservation Sites

6.1.13 There are a number of statutory designated sites for nature conservation within the study area. The sub-section on Ecology and Nature Conversation provides a list of SPAs, SACs, Ramsar Sites, NNRs within 10 km of the Proposed Development Site, and SSSIs and LNRs within 2 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:

- Teesmouth NNR;
- Teesmouth and Cleveland Coast SPA/Ramsar site; and
- Teesmouth and Cleveland Coast SSSI.

6.1.14 There are no designated shellfish waters within the vicinity of the Site. However, there are areas of higher sensitivity habitat that includes mussel beds around South Gare and on rocky substrate just off Redcar to the south along the shore.

Flood Risk

6.1.15 The River Tees (Main River) is located approximately 0.7 km to the west of the Main Site boundary (0.4 km to the north-west of the Main Site boundary at Bran Sands, downstream of the Main Site). The Environment Agency 'Flood Map for Planning' (accessed November 2022) indicates that the whole of the Main Site 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."*

6.1.16 The Environment Agency 'Long Term Flood Risk Map' (accessed November 2022) indicates that small areas of the Main Site (less than 10%), concentrated in the west of the Main Site, are at Low risk of surface water flooding, that is defined as *"land having a less than 1 in 100 but more than 1 in 1,000 [1.0% - 0.1%] annual probability"*. The areas of surface water flood risk are considered to be due to topographic low points and do not form part of wider pluvial flood flow routes.

6.1.17 The Proposed Development includes pipelines and connections, which extend to the south and south-east of the Main Site. Work on the design and construction methods for the pipelines and connections is ongoing however at this stage the assumption is that all pipes would be below ground. The Connection Corridors cross areas of Flood Zone 2 and 3 associated with the Dabholm Gut, Dabholm Beck and The Mill Race to the west of Trunk Road. The Connection Corridors also cross Flood Zone 2 associated with The Fleet.

6.1.18 The STDC Regeneration Master Plan (2019) states that within the area of the Main Site *"surface water flooding is isolated and not widespread but mechanisms for conveying surface water should be reviewed dependent on the final land usage designation*". Environment Agency mapping shows areas at risk of surface water flooding within and adjacent to the Connection Corridors, predominantly associated

with the surrounding watercourses. Environment Agency mapping also shows a flow route present in the low and medium risk scenario crossing the Connection Corridors, starting in the south near the A174 flowing northwards towards North Road and further eastwards towards The Mill Race. Environment Agency mapping also predicts surface water ponding and minor flow routes around the roundabout at Trunk Road as well as around the industrial area between Trunk Road, Greystone Road, the A174 and Mains Dike.

6.1.19 The Main Site and Connection Corridors are underlain by superficial deposits which are denoted Secondary A and Secondary (undifferentiated) aquifers. Therefore, there is the potential for elevated groundwater beneath the Proposed Development Site, as further discussed in the geology/hydrogeology chapter. The Strategic Flood Risk Assessment (SFRA) (Redcar and Cleveland Borough Council, 2016) shows that the Main Site and Connection Corridors are located in areas susceptible to groundwater flooding.

6.1.20 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 Main Site is not shown to be affected, but the proposed Connection Corridors would cross the reservoir flood extents.

6.1.21 The SFRA (Redcar and Cleveland Borough Council, 2016) indicates no historical records of sewer flooding in proximity to the Main Site. The SFRA indicates a number of historic flooding instances including a flooding hotspot to the south of Trunk Road, in vicinity of the proposed Connection Corridors.

6.1.22 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.

Scope of the Assessment

6.1.23 The following potential impacts may be associated with the Proposed Development during construction and operation phases:

- 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 fugitive emissions from the Proposed Development and the resultant impacts to groundwater will be considered with the Geology and Hydrogeology assessments;
- Pollution of surface watercourses within or near the Proposed Development Site during construction, due to chemical spillages or surface water run-off containing elevated concentrations of fine sediment;
- Water quality impacts during operation to surface water features that may receive surface water runoff, cooling water or treated effluent discharges from the Proposed Development. At this stage, one option being proposed is for wastewater from primary/secondary treatment units to be collected and pumped to Bran Sands WwTW via a new pipeline to be provided as part of the Proposed Development for treatment. However, information on effluent streams is still to be confirmed at this stage and where final surface water discharges are likely to

be proposed is under review. These options will be evaluated as part of the assessment;

- Potential increase in nutrient loads from the Proposed Development. With regard to nutrients, where the quality of source water remains fundamentally unchanged by its use by the Production Facility, it should be possible to discharge this water back to the River Tees (via Bran Sands WwTW) whilst also maintaining the appropriate levels regarding nutrient loads (i.e. if water was abstracted from the Tees via Northumberland Water and will be returned to the Tees; if using treated waste water from Bran Sands, this water would be being discharged to the Tees regardless of the Proposed Development). However, if the quality of the water is altered or it is discharged to another water feature further nutrient assessment may be required to determine the change and what mitigation may be required;
- 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 Bran Sands 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/Ramsar site;
- If relevant, watercourse crossing points will need to be carefully assessed taking into account all environmental constraints. Watercourse crossing design (depending on the final routing of the hydrogen pipeline and water and electrical connections within the Connection Corridors) and construction methods have not yet been defined. Where existing pipelines cannot be used or repurposed, watercourses may be crossed by either above ground crossings using existing pipe bridges and other structures, or the pipelines may be installed below ground. Where installed below ground options can be described as open trench or trenchless (e.g. Horizontal Directional Drilling or Micro Bored Tunnel);
- Potential impacts to water conveyance where proposed pipelines cross watercourses during construction and operation (for above ground elements of the pipeline such as entry/exit points), subject to the preferred route corridors of the water, hydrogen, and electricity connections;
- 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 (for any above ground elements of the pipeline such as entry/exit points), subject to the preferred route corridors of the water, hydrogen, and electricity connections;
- Potential changes to existing surface water (pluvial) flows during construction and operation (for above ground elements of the pipeline such as entry/exit points), subject to the preferred route corridors of the water, hydrogen, and electricity connections; and

- Potential risk to construction workers during the construction phase due to risk of fluvial/tidal and reservoir flooding and potential operational impacts of future flooding from all sources to and from the Proposed Development.

6.1.24 The potential alternative option of diversion of water from Brans Sands WwTW to the Proposed Development for water supply would not be expected to impact on water availability in Dabholm Gut or the Tees Estuary which would ordinarily receive this water, given the large and tidal nature of this estuarine waterbody. It is not an abstraction of water given that it is essentially re-use of water that has already been used once by other development prior to reaching Brans Sands WwTW. It would also not be expected to cause an issue with compliance of Brans Sands WwTW with regard to its discharge permit. The WwTW treats to a certain standard and reducing the volume of water discharged would, if anything, reduce potential for any compliance issues as there would be less effluent to treat. However, this will be kept under review as the design of the Proposed Development evolves.

6.1.25 The option of water being supplied from one of the two other potential sources mentioned earlier in this Scoping Report would mean it would need to be confirmed with NWG that increased water volume subsequently entering the Brans Sands WwTW could be treated sufficiently to meet the requirements of their discharge permit. This will be kept under review as the design of the Proposed Development evolves and through consultation with NWG.

6.1.26 Considering the above, it is recommended the **surface water, flood risk and water environment during construction and operation is scoped into future impact assessment**.

6.1.27 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.

6.1.28 Hydromorphological site walkover surveys 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.

6.1.29 Various construction methodologies are being considered which may include more intrusive approaches like open trenching through watercourses. A risk assessment shall be undertaken to determine the most appropriate methods. Where required, proposed crossing methods will be discussed with the Environment Agency and other relevant stakeholders.

6.1.30 Although unlikely, it is currently unknown at this stage whether there will be any new engineered surface water outfalls to watercourses, which can lead to localised adverse impacts. Therefore, a qualitative impact assessment shall be undertaken to determine the effect to the hydromorphology of watercourses.

6.1.31 As outlined above, at this stage, information on effluent streams and where discharges are likely to be proposed is still being evaluated. 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.

6.1.32 A semi-quantitative surface water quality risk assessment will be undertaken for above ground infrastructure using the Sustainable Urban Drainage System (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 assessed qualitatively with reference to propose spillage and containment measures and emergency incident response plans.

6.1.33 Within Coatham Sands is a single open water pond that lies close to the former Redcar Steelworks in an area of dunes that has formed across former slag heaps. Water quality of the pond was previously monitored in 2020-2021 by AECOM for a range of physico-chemical and nutrient parameters as part of baseline studies for the nearby NZT Project. Further baseline monitoring is being undertaken as part of the related H2Teesside scheme to determine whether the baseline of this watercourse has changed since 2021. The data from the H2Teesside scheme will be shared for the purposes of the impact assessment for the Proposed Development. 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.

Water Framework Directive Assessment

6.1.34 Due to the potential for adverse impacts on WFD designated water bodies as described above, a WFD assessment will be required.

6.1.35 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.

6.1.36 Depending on the outcomes of the preliminary assessment and the mitigation included in the Proposed Development, more detailed investigations may be required, which will be determined in consultation with the Environment Agency if necessary.

Nutrient Neutrality Assessment

6.1.37 Natural England have identified the Teesmouth and Cleveland Coast SPA/Ramsar site 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.

6.1.38 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 early in the design process. 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 and consider (1) whether this is a new source or fundamentally already part of the catchment's nutrient baseline; and (2) whether there is a pathway to the SPA. Where there is scope as part of the Proposed Development to reduce nutrient emissions compared to baseline, this 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.

Flood Risk Assessment (FRA) and Drainage

6.1.39 In accordance with the NPPF, applications for energy projects of 1 ha or greater in Flood Zone 1 are to be accompanied by a FRA. The 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. The assessment of flood risk will also take into account the most recent climate change allowances. The results of the FRA will be used to inform the design of the Proposed Development.

6.1.40 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.

Geology, Hydrogeology and Contaminated Land

Baseline Conditions

The Main Site

6.1.41 The entirety of the Main Site (see Figure A-2, Appendix A) is understood to have been previously reclaimed land from the River Tees.

6.1.42 The following geological sequence underlies the Main Site:

- Variable depth of Made Ground to 7 m below ground level (bgl), typically to 2.0 m to 6.0 m where base was proven;
- Superficial 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 Group and Redcar Mudstone).

6.1.43 The aquifer classifications at the Main Site are as follows:

- Tidal Flat Deposits and Glacio-Lacustrine deposits: Secondary A aquifer where sandy and a Secondary (Undifferentiated) aquifer where clayey;
- Glacial Till: Secondary (Undifferentiated) aquifer;
- Redcar Mudstone Formation is classified as a Secondary (Undifferentiated) aquifer;
- Penarth Group: Secondary (Undifferentiated)/Secondary B Aquifer;
- Mercia Mudstone: Secondary B aquifer; and
- Sherwood Sandstone: Principal aquifer - underlying the Mercia Mudstone at Depth.

6.1.44 The following groundwater conditions are anticipated at the Main Site:

- Present within the Made Ground, superficial deposits and bedrock;
- 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 due an assumed discontinuous nature of the Glacial deposits across the site; and
- Records indicate that groundwater is present between 2.29 m AOD and 5.48 m AOD, with an apparent flow towards the north-west.

6.1.45 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 the Main Site.

6.1.46 The following are potential sources of contamination at the Main Site:

- Former steel works including blended ore stocks and coke crushing plant;
- Made Ground with visual/ olfactory evidence of contamination including hydrocarbon and ammoniacal nitrogen (NH_4-N) odours, orange / iron staining, white mineralisation/ sulphur mineralisation on slag, localised tar cobbles, sulphur odours;
- Localised asbestos fibres in Made Ground; and
- Localised Generic Assessment Criteria (GAC) exceedances of cyanide and selected Polycyclic Aromatic Hydrocarbons (PAHs) in Made Ground and Tidal Flat deposits.

6.1.47 The following potential sources of off-site contamination are present within the vicinity of the Main Site:

- Bran Sands landfill;
- Bran Sands WwTW;
- Warrenby 3A / CLE31 landfill on Teesworks Long Acres site;
- Electrical substations;

- Former Redcar Steelworks (including blast furnace, sinter plant, power station, crushing and blending plant and former pellet plant – currently being demolished);
- Former Redcar and Coatham iron works;
- Known Heavy Fuel Oil (HFO) spill adjacent to south-east corner of the Main Site; and
- Railway lines and sidings.

6.1.48 The ground beneath the Main Site 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.

Hydrogen Export Pipeline Corridor

6.1.49 A review of the publicly available British Geological Survey (BGS, 2022) geological maps indicates the following geological sequence at the Hydrogen Export Pipeline Corridor (see Figure A-2, Appendix A):

- Variable depth of Made Ground to 4.50m bgl;
- Tidal Flat deposits in the north and south comprising sand and silt to a maximum depth of 12.20 m bgl;
- Blown Sand deposits intersect through the north of the Tidal Flat Deposits between the Teesworks Gate House and the Teeswork site area comprising grey to a maximum explored depth of approximately 12.20 m bgl;
- Glaciolacustrine present at the Trunk Road and to the west, south-west and north-east of the site observed to a depth of 9.00m bgl;
- Till (Diamicton) present in the south-eastern section. Nearby borehole records indicate the geology to likely comprise soft to stiff brown mottled grey with occasionally cobbles and fine sand partings to a maximum explored depth of 5.00 m bgl; and
- Redcar Mudstone Formation, encountered at approximately 12.20 m bgl and extended to a maximum explored depth of 28.20 m bgl.

6.1.50 The aquifer classifications at the Hydrogen Export Pipeline Corridor are as follows:

- Blown Sand and Tidal Flat Deposits: Secondary A Aquifer where sandy and a Secondary (Undifferentiated) aquifer when clayey; and
- Redcar Mudstone Formation: Secondary (Undifferentiated) Aquifer.

6.1.51 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 the Hydrogen Export Pipeline Corridor.

6.1.52 Potential sources of contamination located within the Hydrogen Export Pipeline Corridor include:

- Redcar Trunk Road Landscaping: Historical Landfill with the last input date of August 1979;
- West Coatham Lane: Historical Landfill with the last input date of February 1993;
- Wilton, Perimeter Mounds: various industrial waste landfills (factory curtilage) are located around the site, Authorised and Historical Landfills;
- Possible asbestos within Made Ground;
- Ironworks;
- Railway lines and sidings;
- Slag Brick Works;
- Slag Wool Works;
- Areas of reclaimed land; and
- Possibly infilled land.

6.1.53 The following potential sources of off-site contamination are within the vicinity of the Hydrogen Export Pipeline Corridor:

- Teesport Eston Tip: Historical Landfill with the last input date of September 1993;
- Bran Sands Landfill, taking special waste: Authorised Landfill licensed issued May 1977;
- Warrenby Landfill, household, commercial and industrial waste: Authorised Landfill and Historical Landfills;
- Adjacent to Teesdock Road: Historical Landfill with the last input date of March 1983;
- Railway lines and sidings;
- Iron and Steelworks;
- Tar Macadam Works;
- Slag Wool Works;
- Tanks; and
- Pumping station.

Electrical Connection Corridor

6.1.54 A review of the publicly available BGS geological maps indicates the following geological sequence at the Electrical Connection Corridor (see Figure A-2, Appendix A):

- Majority Made Ground to a maximum depth of 4.50 m bgl;
- The southern Electrical Connection Corridor area is not mapped to be underlain by Made Ground and no borehole records of the area are available. However,

given the current level of development in the area, a degree of Made Ground is expected to be present;

- Tidal Flat Deposits across majority of corridor to a maximum depth of 12.20 m bgl;
- Blown Sand Deposits intersect through north and central to southern section of the corridor to a maximum explored depth of approximately 12.20 m bgl;
- Glaciolacustrine Deposits present to the south. Encountered in nearby boreholes explored to a maximum depth of 9.00 m bgl;
- Till Deposits present in east and south-east to a maximum explored depth of 5.00 m bgl; and
- Redcar Mudstone Formation was encountered at approximately 12.20 m bgl and extended to a maximum explored depth of 28.20 m bgl.

6.1.55 The aquifer classifications at the Electrical Connection Corridor are as follows:

- Blown Sand and Tidal Flat Deposits: Secondary A Aquifer where sandy and a Secondary (Undifferentiated) aquifer when clayey; and
- Redcar Mudstone Formation: Secondary (Undifferentiated) Aquifer.

6.1.56 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 the Electrical Connection Corridor.

6.1.57 Potential sources of contamination located within the Electrical Connection Corridor include:

- Redcar Trunk Road Landscaping: Historical Landfill with the last input date of August 1979;
- West Coatham Land: Historical Landfill with the last input date of February 1993;
- Wilton, Perimeter Mounds: industrial waste landfill (factory curtilage), Authorised Landfill – licence issued October 1978;
- Ironworks;
- Made Ground;
- Asbestos;
- Reclaimed land;
- Railway lines and sidings;
- Slag Brick Works;
- Slag Wool Works; and
- Possibly infilled land.

6.1.58 The following potential sources of off-site contamination are present within the vicinity of the Electrical Connection Corridor:

- Teesport Eston Tip: Historical Landfill with the last input date of September 1993;

- Bran Sands Landfill: taking special waste, Authorised Landfill – licence issued May 1977;
- Warrenby Landfill: household, commercial and industrial waste, Authorised Landfill license issued June 1977;
- Ironworks and Steelworks;
- Tar Macadam Works;
- Slag Wool Works;
- Railway line and sidings;
- Tanks; and
- Pumping station.

Water Connection Corridor

6.1.59 A review of the publicly available BGS geological maps and boreholes indicates the following geological sequence at the Water Connection Corridor (see Figure A-2, Appendix A):

- Made Ground present to a maximum depth of 4.50 m bgl. The majority of the remaining site is expected to comprise a degree of Made Ground given the development in the area;
- Tidal Flat Deposits were encountered to a maximum depth of 12.20 m bgl. Peat was observed to the eastern of the site area to approximately 0.60 m bgl and approximately 10 m bgl;
- Blown Sand Deposits intersect the Tidal Flat Deposits in the north to the Trunk Road were identified to a maximum depth of 14 m bgl;
- Glaciolacustrine Deposits are understood to be present extending south-eastwards from the Trunk Road nearby boreholes, explored to a maximum depth of 9.00 m bgl;
- Till is present beyond Glaciolacustrine Deposits in a south-easterly direction, off-site boreholes to the far east of the site found Till to a maximum explored depth of 5.00 m bgl; and
- Redcar Mudstone Formation: Borehole records encountered this at approximately 12.20 m bgl and extended to a maximum explored depth of 28.20 m bgl.

6.1.60 The aquifer classifications at the Water Connection Corridor are as follows:

- Blown Sand and Tidal Flat Deposits: Secondary A Aquifer where sandy and a Secondary (Undifferentiated) aquifer when clayey; and
- Redcar Mudstone Formation: Secondary (Undifferentiated) Aquifer.

6.1.61 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 the Water Connection Corridor.

6.1.62 Potential sources of contamination located within the Water Connection Corridor include:

- Redcar Trunk Road Landscaping: Historical Landfill with the last input date of August 1979;
- West Coatham Land: Historical Landfill with the last input date of February 1993;
- Wilton, Perimeter Mounds: industrial waste landfill (factory curtilage), Authorised Landfill – licence issued October 1978;
- Iron and Steel works;
- Slag Wool Works;
- Slag Brick Works;
- Railway line and sidings;
- Reclaimed land;
- Made Ground;
- Asbestos; and
- Possibly infilled ground (water).

6.1.63 The following potential sources of off-site contamination are present within the vicinity of the Water Connection Corridor:

- Teesport Eston Tip: Historical Landfill with the last input date of September 1993
- Bran Sands Landfill: taking special waste, Authorised Landfill – licence issued May 1977;
- Warrenby Landfill: household, commercial and industrial waste, Authorised Landfill license issued June 1977;
- Iron and Steel Works;
- Railway lines and sidings;
- Tanks; and
- Pumping station.

Scope of the Assessment

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

- Disturbance of contaminated soils and contaminated perched groundwater and creation of new pathways to sensitive receptors (including construction workers and controlled waters) during construction;
- Operational impacts may include spillages and leakages of contaminants from the Proposed Development; and
- Land stability issues including soft ground, presence of peat, remnant buried services and structures.

6.1.65 No designated geological sites or sensitive / valuable non-designated features have been identified within the study areas for the Proposed Development. Therefore, impacts of designated geological sites are scoped out of further assessment.

6.1.66 Considering the above, it is recommended the **geology, hydrogeology and contaminated land topic is scoped into the future impact assessment**.

6.1.67 A Phase 1 desk-based assessment (DBA) will be completed to identify potential contaminative uses of the Proposed Development site and identify the potential for land contamination and potential pathways to sensitive receptors. The DBA will be prepared in observance of the current Environment Agency guidance 'Land Contamination: Risk Management' (2021c). The assessment will consider the potential for contaminants associated with current and historic land use in and around the Proposed Development to be present within the Proposed Development Site. A conceptual site model (CSM) will be developed for the land potentially affected by the Proposed Development.

6.1.68 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 will be discussed and agreed in advance with RCBC and statutory consultees such as the Environment Agency.

6.1.69 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.

6.1.70 As appropriate, the EIA will inform the design as to where mitigation measures may be required during Proposed Development construction or operation. These mitigation measures 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 Main 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.

Ecology and Nature Conservation

Baseline Conditions

Study Area

6.1.71 The 'zone of influence' (ZoI) for the Proposed Development is the area over which ecology and nature conservation features may be affected by biophysical changes because of the Proposed Development and associated activities (CIEEM, 2022). 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 (EcIA). The approach taken is described below.

6.1.72 A 10 km study area around the Proposed Development Site has been applied to identify European Sites (including candidate European Sites and Ramsar Sites) 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 birds or marine mammals. The 10 km study area is worst case and reflects standard guidance for air quality impact assessment during operation of an industrial facility (Environment Agency and Department for Environment, Food & Rural Affairs, 2016), which is typically the worst case (most extensive) pathway for a potential impact on ecology and nature conservation. However, it is noted that the sub-section on Air Quality within Section 6 of this Scoping Report concludes that there would be no emissions to atmosphere as part of the normal operation of the Proposed Development that are likely to affect local air quality, and consequently further air quality impact assessment of operation is scoped out. Accordingly, the potential ZoI for the Proposed Development will be refined further later for the purposes of the final ecological impact assessment.

6.1.73 The study area for the identification of national and local statutory nature conservation sites, local 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 of the Proposed Development Site. This distance is again informed by standard guidance for air quality impact assessment and also other good practice (Chartered Institute of Ecology and Environmental (CIEEM), 2017 & 2022). The potential ZoI for the Proposed Development will be refined further later for the purposes of the final ecological impact assessment with reference to the sub-section on Air Quality within Section 6 of this Scoping Report.

6.1.74 The desk study areas applied are summarised below in Table 6-2.

6.1.75 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 check for species with disturbance buffer zones such as badger). Some species have specific geographical considerations which may dictate wider surveys. The species specific survey areas to be observed are detailed later in this section, some of which account for direct impacts such as noise and air quality effects, where appropriate.

Table 6-2: Sources of Desk Study Data

Data Source	Search Area[7]	Accessed/data received	Data Obtained
Environmental Records Information Centre (ERIC) North East	Up to 2km	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 several species
Multi Agency Geographic Information for the Countryside (MAGIC)	Up to 10km	November 2022	10km for European Sites 2km for all other features (national and local statutory designations, ancient woodland, European Protected Species records, priority habitats)

Data Source	Search Area[7]	Accessed/data received	Data Obtained
Joint Nature Conservation Committee (JNCC) website	Up to 10km	November 2022	Reasons for designation and other information on international and local statutory designated sites
Natural England Designated Sites View website (Natural England, 2022b)	Up to 10km	November 2022	Reasons for designation and other information on statutory designated sites
Environment Agency Ecology and Fish Data explorer	Up to 2km	November 2022	Detailed count data for fish, aquatic macroinvertebrates, invasive species and macrophytes in the area of the Proposed Development
National Biodiversity Network (NBN) Atlas explorer website (NBN Atlas)	Up to 5km	November 2022	Detailed count data for fish, aquatic macroinvertebrates, invasive species and macrophytes in the area of the Proposed Development
British Trust for Ornithology (BTO, 2022) Wetland Birds Survey (WeBS)	Data specific	10 May 2022	Detailed count data for wetland birds occurring within selected wetland habitat count areas across Teesside

Statutory Designated Sites

6.1.76 Within 10 km of the Proposed Development Site there are four European Sites, as follows:

- Teesmouth and Cleveland Coast Special Protection Area (SPA), 275 m to the north of the Proposed Development Site at it closest point;
- North York Moors SPA, 8.2 km south-east of the Proposed Development Site;
- North York Moors Special Area of Conservation (SAC), 8.2 km south-east of the Proposed Development Site; and
- Teesmouth and Cleveland Coast Ramsar Site, 380 m to the north-west and 315 m to the south of the Proposed Development Site at it closest point.

6.1.77 Within 2 km of the Proposed Development Site there are two national statutory nature conservation sites, as follows:

- Teesmouth National Nature Reserve (NNR), 1.7 km north-west of the Proposed Development Site; and
- Teesmouth and Cleveland Coast Site of Special Scientific Interest (SSSI), 230 m north-west and 315 m south of the Proposed Development Site.

6.1.78 There are no local statutory nature conservations sites in the study area.

Non-statutory Designated Sites

6.1.79 Within 2 km of the Proposed Development Site there are three non-statutory nature conservation sites, as follows:

- Eston Pumping Station Local Wildlife Site (LWS), which is partly within the Proposed Development Site;
- Coatham Marsh LWS, 0.4 km east of the Proposed Development Site; and
- Wilton Woods Complex LWS, 1.2 km south of the Proposed Development Site.

Habitats

6.1.80 The Proposed Development Site is located entirely within the terrestrial (including freshwaters) environment. Consequently, no further consideration is given to marine habitats.

6.1.81 There are desk study records of the following known or potential terrestrial and freshwater Habitats of Principal Importance (HoPI) within 1 km of the Proposed Development Site:

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

6.1.82 The habitats present within the Proposed Development Site, including any HoPI, will be determined through 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, 2022c)).

6.1.83 Habitat surveys will be completed for locations where permanent infrastructure may be constructed as part of the Proposed Development, along the proposed pipeline and connection routes, 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 6-4 below.

Protected and Notable Species (Excluding Birds)

6.1.84 It is anticipated that some habitats within the zone of influence of the Proposed Development Site will have suitability to support protected and notable species including bats, badger, otter, water vole, reptiles, 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.

6.1.85 Great crested newt is scoped out as a protected species constraint with reference to 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. No further consideration will therefore be given to this species.

6.1.86 The scope of the planned (and ongoing) ecology surveys is set out in Table 6-4 below. The survey methodologies will follow Natural England standing advice, CIEEM best practice guidance and industry guidance for protected species survey.

6.1.87 The bird surveys are more advanced than the other species surveys, so consequently it is possible to provide more detail on the work completed and the survey results. This information is provided below.

Birds

6.1.88 Preliminary baseline data gathering was gathered 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.

6.1.89 Preliminary wetland bird counts were completed between January and March 2022 (inclusive), within the broad areas summarised in Table 6-3. These were undertaken to assist early design phase decisions, primarily the shortlisting of sites for development and routing of Connection Corridors.

Table 6-3: Summary of Ornithology Surveys Completed to Date

Survey Area	January 2022	February 2022	March 2022
The Foundry/HyGreen 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

6.1.90 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 that have been identified as very sensitive due to their proximity to the Proposed Development and reliance on them by birds either during potentially adverse tide and/or weather conditions, or on a regular basis irrespective of the conditions.

6.1.91 Within the vicinity of the survey area for the Proposed Development these include:

- Dabholm Gut, which supports large numbers of feeding waders and ducks;
- Bran Sands Lagoon, which supports roosts;
- 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.

6.1.92 Within the Seal Sands survey area, between the River Tees and the A178, 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;
- 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.

6.1.93 West of Seal Sands and the A178, 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.

6.1.94 Further baseline data will be gathered as per the methods and within the areas summarised in Table 6-4, including further surveys as outlined. This includes all of the habitats surveyed previously, plus a wider area that includes more habitat to the north-west, west and south of the Proposed Development Site, including the North Tees Marshes.

Invasive Non-Native Species (INNS)

6.1.95 The desk study identified two plant INNS in association with the waterbody located immediately to the east of the Main Site at NZ 54999 24965. The species recorded were New Zealand pigmyweed (*Crassula helmsii*) and giant hogweed (*Heracleum mantegazzianum*).

6.1.96 Checks will be made for INNS during the habitat surveys and also during the aquatic ecology surveys and will be listed in the subsequent reports for consideration in the ecological impact assessment.

Table 6-4: Summary of Proposed Ecological Surveys and Data Collection

Survey	Scope	Survey Timing	Survey Extents
Phase 1 habitat survey and Habitat Condition Assessment to inform Biodiversity Net Gain (BNG) Assessment.	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. 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. Record of 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. The information will confirm the ecological baseline and form the basis of the calculation of potential permanent and temporary habitat effects within the Ecological Impact Assessment (EcIA) and for purposes of the BNG assessment.	Optimal time – April to October but can be carried out at any time of year.	Accessible terrestrial habitats within the Proposed Development Site and its surrounding 50 m buffer.
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 Birds Survey (WeBS)[2] method, supplemented with a 'look-see' or field count method. 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	Between October 2022 and March 2023.	Intertidal; tidal saltmarsh; other tidal and non – tidal wetland habitats; and terrestrial habitats up to a maximum of approximately

[2] 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 BTO, 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.)

Survey	Scope	Survey Timing	Survey Extents
	operation of the Proposed Development and for which sufficient data to inform impact assessment cannot be obtained from third parties.		1 km[3] from the Proposed Development Site boundary.
Breeding birds within the Proposed Development Site and in functionally linked land	Monthly surveys using the above methodology will be completed. Spring passage birds will also be recorded during these surveys. Breeding bird surveys will be carried out within terrestrial habitats, using an appropriate methodology[4], 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 supporting breeding birds may be affected for extended periods of time).	Between March 2023 and July 2023.	As above for non-breeding birds Survey areas for breeding terrestrial birds, if required, will be determined in more detail as the Proposed Development design progresses.
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 Potential Roost Feature ('PRF') assessment survey in accordance with The Bat Conservation Trust (BCT) guidance (Collins et al., 2016). Should a structure or building be impacted this will also be subject to PRF assessment in accordance with BCT Guidance (Collins et al., 2016). Information collated on the location of trees and buildings that are suitable for roosting bats will inform design and offset buffers to avoid direct effects upon potential roost sites. Where avoidance is not possible, the PRF assessment will inform requirements for more detailed roost surveys (as detailed below).	Any time of year.	As per the Phase 1 Habitat Survey results.

[3] Plus some areas of permanently submerged offshore habitat adjacent to Coatham Sands and Bran Sands further than 1 km from the Proposed Development Site. The survey extent is guided by a combination of the presence and extent of suitable habitat as well as the potential range and potential spatial extent of potential impacts. As a general rule, impacts on birds would be expected to occur up to a maximum of 500 m from the Proposed Development, but the survey area is extended beyond this up to a maximum of 1 km to capture the use by birds of adjacent connected habitats where these are known to occur. This is particularly the case where the survey area overlaps Teesmouth and Cleveland Coast SPA.
[4] Such as the Common Birds Census (Marchant, 1983).

Survey	Scope	Survey Timing	Survey Extents
Bats – Foraging / Commuting	Habitats will be appraised for their suitability to support foraging and commuting bats during the extended Phase 1 habitat survey. Activity surveys will be undertaken with reference to published guidance (Collins et al., 2016) where significant effects could arise, e.g. as a result of permanent habitat loss. It is not considered warranted that detailed bat activity surveys will be required along the pipeline routes given the temporary nature of habitat loss, and the open context of most of the affected landscape which means habitat severance is not likely to occur.	If required: April/May to September 2023 inclusive.	Limited to areas of suitable habitat which will be permanently lost to facilitate the Proposed Development.
Bats – roosting	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. 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 et al., 2016). Appropriate mitigation measures will be developed, and European Protected Species Mitigation (EPSM) licensing requirements, if necessary, where trees with confirmed/ potential bat roosts cannot be entirely avoided.	Any time of year. If required, between April/May and September 2023.	Features with bat roost suitability identified during the Phase 1 Habitat Survey.
Badger	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.	Any time of year – and will be combined with the Phase 1 Habitat Survey.	As per the result of Phase 1 Habitat Survey, with focus on proposed Connection Corridors.
Otter and Water Vole	Presence/absence surveys based on Dean *et al*. (2016) and Chanin (2011) looking for field signs along watercourses and ditches where open cut crossing techniques may be required, will be conducted. A spring survey will be	Otter surveys can be completed at any time.	Up to 500 m length of the watercourse – 250 m up and down stream of crossing point.

Survey	Scope	Survey Timing	Survey Extents
	completed, with a second survey as required to confirm presence/ likely absence.	Water Vole - spring survey before end of June 2023; if required a second survey before end September 2023.	
Reptiles	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 et al, 2013). 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 provided by in Froglife Advice Sheet 10: Reptile Surveys (Froglife, 1999). Survey involves laying refuges (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. 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 EcIA 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.	If required: Optimal – April to middle of June and September. However, surveys will be carried out between April and September 2023 inclusive depending on the weather.	Only likely required at potential permanent infrastructure locations - subject to the findings of the Phase 1 Habitat Survey.
Terrestrial Invertebrates	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.	If required, surveys will be completed between April and September 2023.	As per the Phase 1 Habitat Survey results – focused on areas of permanent habitat loss.
Fish	There is potential for impacts to fish through open-trench construction methodologies as well as, potential water quality impacts during construction.	Summer 2023 (June-July).	Accessible rivers, ditches and ponds within 200 m of the

Survey	Scope	Survey Timing	Survey Extents
	The scope and requirements for specific aquatic ecology surveys will be informed by aquatic scoping survey in April 2023, and likely to include surveys of ditches, watercourses, and ponds within the Proposed Development Site. The initial scoping surveys will identify where further surveys are required for fish, including INNS.		Proposed Development Site that are likely to be impacted. Not including artificial waterbodies such as water storage ponds.
Aquatic macroinvertebrates	There is potential for impacts to aquatic macroinvertebrates through open-trench construction methodologies as well as, potential water quality impacts during construction. The scope and requirements for aquatic macroinvertebrate surveys will be informed by desk study. INNS of aquatic macroinvertebrates will also be assessed.	Spring (March-May 2023) and Autumn (September-November 2023) for watercourses and Summer (June-August 2023) for ponds.	Accessible rivers, ditches and ponds within 200 m of the Proposed Development Site that are likely to be impacted. Not including artificial waterbodies such as water storage ponds.
Plants	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. Pond macrophytes will be identified as part of the pond PSYM method which requires the identification of macrophytes and macroinvertebrates. INNS of aquatic macrophytes will also be assessed.	Summer 2023 (June-August 2023).	Relevant habitats as identified by the habitat surveys. Locations indicated by the desk study results. Accessible ponds within the Proposed Development Site that are likely to be impacted.

Scope of Assessment

6.1.97 The following potential impacts and their resulting effects on ecology and nature conservation features will be considered within the EcIA for the Proposed Development:

- temporary disturbance impacts and permanent loss and degradation of nature conservation designations and other relevant terrestrial and habitats within the Proposed Development Site during construction, and within the wider ZoI 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; and
- 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 (no operational air quality impact pathways are identified in the sub-section on Air Quality within Section 6 of this Scoping Report).

6.1.98 Considering the above, an assessment of **terrestrial and freshwater ecology and nature conservation is scoped into the future impact assessment**. Marine ecology is scoped out given the Proposed Development Site does not interface with the marine environment.

6.1.99 The EcIA 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'.

6.1.100 CIEEM (2022) makes clear that 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.

6.1.101 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 EcIA.

6.1.102 To support focussed EcIA 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);
- 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).

6.1.103 Design and impact avoidance measures will be used to inform the assessment of likely significant effects. These measures will seek to minimise impacts on ecology and nature conservation or otherwise to achieve legislative compliance (e.g. 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. They are likely to include:

- Consideration of routeing of proposed connection and pipeline 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;
- Routeing of proposed Connection Corridors, where these require new infrastructure, to avoid sensitive habitats such that the potential effects on relevant ecological receptors are avoided or reduced to levels that are not significant;
- 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, noise prevention or amelioration through the implementation of a CEMP; 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.

6.1.104 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 ecological receptors will be identified.

Habitats Regulations Assessment (HRA)

6.1.105 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).

6.1.106 Stage 1 of the HRA process (Test of Likely Significant Effects) will consider the potential pathways of effect between the Proposed Development and the European designated sites within 10 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 designated 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 suite of bird surveys outlined above.

6.1.107 Where there is potential for the Proposed Development to have a likely significant effect upon the qualifying features of the relevant 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.

6.1.108 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 (BNG)

6.1.109 Under Schedule 14 Part 2(3) of the Environment Act 2021, the Proposed Development will be required to achieve a Net Gain in biodiversity of at least 10% in order to attain planning permission. A BNG assessment will be undertaken for the Proposed Development using the current iteration of the BNG metric published by Natural England (currently this is Biodiversity Metric 3.1 (Natural England, 2022c)).

Landscape and Visual Amenity

Baseline Conditions

6.1.110 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.

6.1.111 Ecological European designated sites outlined in the sub-section on 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 industrial installations form a dramatic skyline when viewed from the surrounding hills.

6.1.112 There are no local authority Landscape Character Designations covering the industrial complexes along the banks of the River Tees. However, the RCBC 'Landscape Character SPD' (March 2010) notes that this industry has a strong influence on neighbouring landscape character areas.

6.1.113 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)

6.1.114 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)

6.1.115 Viewpoints, chosen to represent a typical range of views of the Proposed Development will be agreed with relevant stakeholders. The viewpoints will be chosen to include appropriate receptor types, likely to include:

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

Scope of the Assessment

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

6.1.117 Considering the above, the **landscape and visual amenity topic will be scoped into the future impact assessment**.

6.1.118 Given the existing high levels of lighting in the area, being industrial in nature, it is considered unlikely for significant effects on sensitive human receptors from any night time lighting associated with the Proposed Development. Therefore, this has been scoped out of the assessment.

6.1.119 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);

- 'Visual Representation of Development Proposals', Technical Guidance Note 06/2019 (Landscape Institute, 2019);
- Assessing landscape value outside national designations, Technical Guidance Note 02/21 (Landscape Institute, 2021); and
- Infrastructure, Technical Guidance Note 04/2020 (Landscape Institute, 2020).

6.1.120 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.

6.1.121 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 the sub-section on Cultural Heritage.

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

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

6.1.123 This will be supported by 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.

6.1.124 A suitable number of representative views will be identified within the Zone of Theoretical Visibility (ZTV) for the Main Site. 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 (following discussions with stakeholders) 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.

6.1.125 It is anticipated that sensitive visual receptors that will need to be considered will include;

- Receptors to the north in Seaton Carew, North Gare Sands, South Gare breakwater;
- Receptors to the east in Redcar, Coatham, Warrenby, Marske-by-the-Sea;
- Receptors to the south from Kirkleatham, New Marske, Wilton, Eston Nab, Old Lackenby, South Bank; and
- Receptors to the west from Greatham, Saltholme (Royal Society for the Protection of Birds (RSPB) site and nature reserve), Cowpen Bewley, and Billingham.

6.1.126 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. Technical details regarding the height of the tallest elements of the Proposed Development will enable the definition of the Study Area within which landscape or visual effects have the potential to be significant. Any assumptions made in relation to the parameters defined for the purposes of the assessment will be clearly outlined.

6.1.127 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 06/2019. The location of representative views and photomontages will be agreed in consultation with RCBC and other key stakeholders.

6.1.128 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 with reference to the above guidance.

6.1.129 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. Measures during construction, including best practice will be included and implemented through the CEMP. Measures in general are likely to include:

- External surfaces of the Proposed Development to be designed to be in-keeping with those of the local area;
- Siting of temporary laydown areas or compounds outside of viewpoints for potentially sensitive receptors, where possible; and
- Avoidance of vegetation removal or pruning where this has been identified as providing existing screening and the inclusion of locally appropriate vegetation with potential to provide future screening within any landscape planting.

Cultural Heritage

Baseline Conditions

6.1.130 There are no designated heritage assets within the Proposed Development Site.

6.1.131 There are two non-designated heritage assets recorded on the Redcar and Cleveland Historic Environment Record (HER) located partially within the Main Site, comprising the site of a jetty at South Gare and a spur of rail which linked Redcar Iron Works to the jetty. There are several heritage assets within the Electrical and Water Connection Corridors comprising the sites of medieval and post-medieval salt mounds and 19th century industrial features associated with Coatham Iron Works. 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. In addition, there may be extant features of industrial archaeological interest present within the Main Site. There are no recorded heritage assets within the Hydrogen Export Pipeline Corridor or within the indicative temporary Construction Laydown Area. The site of West Coatham deserted medieval village and a 19th century mill race are located in the Water Connection Corridor, west of Dormanstown. The sites of five medieval salterns are recorded in the southern part of the Electrical Connection Corridor.

6.1.132 The closest designated assets to the Main Site are a group of three Grade II listed buildings associated with Marsh Farmhouse and Cottage, located approximately 1.3 km to the south-east. The closest designated heritage assets to the Connection Corridors include Kirkleatham Conservation Area, located approximately 245 m from the Hydrogen Export Pipeline Corridor, and a range of buildings associated with Manor Farmhouse, all Grade II listed and located approximately 385 m east of the Hydrogen Export Pipeline Corridor and Water Connection Corridor. There are an additional 50 designated heritage assets within 5 km of the Main Site, all comprising listed buildings, and consisting of five Grade I buildings; seven Grade II* buildings, and 38 Grade II listed buildings. The majority of the listed buildings are located within conservation areas, of which there are eight within 5 km of the Main Site and Connection Corridors, comprising Coatham, Kirkleatham, Yearby, Wilton, Marske-by-the-Sea, Upleatham, Ormesby Hall and Seaton Carew). There are no scheduled monuments, registered parks and gardens, registered battlefields or world heritage sites within 5km of the Main Site. There are 23 scheduled monuments within 5km of the Connection Corridors, 21 of this number relating to a prehistoric funerary landscape and comprising barrow monuments on Eston Hills. The remaining two comprise a medieval manorial settlement to the south of Marske and a First World War acoustic mirror in Redcar.

Scope of the Assessment

6.1.133 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 Main Site and along the Connection Corridors 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.

6.1.134 Below-ground infrastructure associated with the Connection Corridors may result in physical impacts to buried heritage assets, but its physical presence, and that of any proposed surface-mounted conduit, is unlikely to result in changes to the settings of heritage assets, as the connections would not be visually prominent features. However, there may be temporary changes to the settings of heritage assets during the construction of the Connection Corridors.

6.1.135 Considering the above, it is recommended **cultural heritage during construction and operation is scoped into future impact assessment**.

6.1.136 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.

6.1.137 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 Landscape and Visual Amenity (LVIA) assessment and noise contour data (as applicable) produced for the Noise and Vibration assessment.

6.1.138 Data sources consulted during the production of the DBA will include but not be limited to:

- National Heritage List for England database;
- Formal searches of the Redcar and Cleveland HER, including the Historic Landscape Characterisation data;
- Online resources including the BGS 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.

6.1.139 The results of the DBA will inform whether further evaluation is required to characterise the potential archaeological resource. Recognising the ground conditions within the Proposed Development Site, which are not conducive to traditional geophysical survey methods, further evaluation would likely comprise an assessment of site-specific geotechnical data, carried out for the Proposed Development, to identify and confirm the extent of made ground within the Site, and the potential for archaeological features and deposits to be present.

6.1.140 The DBA and ES will comply with relevant legislation, national and local planning policy, specifically the NPPF and the Redcar and Cleveland Local Plan, and in line with the relevant guidance, including:

- PPG, Conserving and enhancing the historic environment (Ministry of Housing, Communities and Local Government (MHCLG), 2019);
- Historic Environment Good Practice Advice in Planning Note 2. Managing Significance in Decision Taking in the Historic Environment. (Historic England, 2015);
- Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets (2nd edition) (Historic England, 2017);
- Historic Environment Statement of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12. (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 the Chartered Institute for Archaeologists (CIfA), Principles of Cultural Heritage Impact Assessment in the UK (IEMA, *et al*., 2021).

6.1.141 Consultation with relevant heritage officers will be undertaken during the production of the DBA and the ES.

6.1.142 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). 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 embedded mitigation. Such measures may include:

- External surfaces of the Proposed Development to be designed to be in-keeping with those of the local area to minimise potential changes to the setting of heritage assets;
- Siting of temporary laydown areas or compounds away from potentially sensitive heritage assets;
- Avoidance of vegetation removal or pruning where this has been identified as providing existing screening for heritage assets and the inclusion of locally appropriate vegetation with potential to provide future screening where this may conserve or enhance the setting of heritage assets; and
- The use of trenchless technologies for the construction of pipelines to avoid physical impacts to heritage assets within Connection Corridors, in addition to siting of Connection Corridors within existing pipeline routes where practicable.

6.1.143 An assessment of the effect of the Proposed Development will then be determined and additional mitigation measures may be proposed where significant effects are predicted. Additional mitigation measures may include:

- A programme of archaeological investigation, recording and reporting set out in a Written Scheme of Investigation that would be discussed with and agreed with the Archaeological Advisor(s) of the relevant local planning authority.

Traffic and Transportation

Baseline Conditions

6.1.144 The primary route to the Main Site will be via the existing access roads leading to the A1085 Trunk Road / West Coatham Lane / Steel House Gate roundabout to the south. From this junction to the south, the A19 can be accessed from either the A66, passing through the north and centre of Middlesbrough, or the A174, passing to the south.

6.1.145 There are no PRoWs crossing or adjacent to the Main Site. Whilst the Main Site 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 2014087357[5]) after which date the restriction will be reviewed.

6.1.146 The following PRoWs are located to the south of the Bran Sands WwTW within 1 km of the Proposed Development Site:

- Bridleway 116/9 (partially within the Proposed Development Site);
- Footpath 116/31;

[5] https://consult.defra.gov.uk/natural-england/open-access-restriction-at-south-teesdale/results/2014087357_consultation_outcome_review__2021_southteesindest.pdf

- Footpath 102/2; and
- Footpath 102/2A.

6.1.147 The following PRoWs are located in the vicinity of Warrenby, east of the Main Site and within 1 km of the Proposed Development Site:

- Bridleway 116/32;
- Bridleway 116/36; and
- Bridleway 116/33.

6.1.148 The following PRoWs are located in the vicinity of Wilton International complex, within 1 km of the Proposed Development Site:

- Bridleway 116/10 (partially within the Proposed Development Site);
- Bridleway 102/194;
- Bridleway 124/179; and
- Footpath 102/193.

6.1.149 In addition to the above PRoWs, a non-PRoW 'Recreational Route' with assumed public use is located approximately 0.3 km north of the Main Site, leading north of the Main Site. These PRoWs and route of assumed public access may be affected by the final routes chosen for the electrical and water connections and hydrogen export pipeline.

6.1.150 The proposed Electrical Connection Corridor and Hydrogen Export Pipeline Corridor cross the Tees Valley Railway Line. The Water Connection Corridor does not cross this line, however industry service rail lines may need to be crossed.

Scope of the Assessment

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

- generation of traffic during construction (including Abnormal Indivisible Loads (AIL)) affecting the local and strategic road network; and
- construction of water, hydrogen, and electrical connections affecting road and rail links and PRoWs.

6.1.152 Considering the above, it is recommended **traffic and transportation is scoped into the future impact assessment**.

6.1.153 During the operational phase of the development, it is anticipated that there will be a work-force of approximately 15 people working Monday to Friday during the day, with 1 security person on site during the night

6.1.154 Operational resources (water and electricity) will be delivered to the Main Site and hydrogen transported offsite to offtakers by pipeline connections. Other operational and maintenance consumables will be managed to be kept as low as is reasonably practicable (ALARP). Therefore, it is considered that the effects of operational traffic would be negligible and a detailed assessment of the operational phase of the Proposed Development is proposed to be scoped out.

6.1.155 The principal vehicle movements are anticipated to be associated with the construction phase of the Proposed Development. The volume of construction vehicles associated with the delivery of plant and materials is likely to be 60 two-way vehicle movements per day during the peak construction period.

6.1.156 In addition there is also likely to be around 769 construction workers on site at the peak of construction, which will result in around 384 two way vehicle movements per day based upon an average car occupancy of 2, which is consistent with other local developments.

6.1.157 To fully address the impacts of the construction phase on the transport network, a Transport Assessment (TA) will be produced (though this will be confirmed following determination of the final 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 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.

6.1.158 The traffic and transportation chapter in the ES will summarise the salient points from the TA. It will also relate the magnitude of impact and significance of potential effects to criteria contained in the Institute of Environmental Assessment (IEA, 1993) 'Guidelines for the Environmental Assessment of Road Traffic' and the Design Manual for Roads and Bridges (DMRB) 'LA103 Scoping projects for environmental assessment' and 'LA104 Environmental assessment and monitoring'. 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 AIL;
- local network impact analysis – the size of the study area is to be confirmed with the LPAs and National Highways, and key junctions may be identified by these stakeholders that require detailed capacity analysis;
- consideration of the local PRoW for leisure and commuting uses, and whether their use would be affected by the Proposed Development;
- construction of the electrical connection, hydrogen export pipeline and water connection, and any affect they will have on road and rail links;
- cumulative impact assessment; and
- the formulation of mitigation measures, such as a Construction Worker Travel Plan (CWTP) to promote sustainable journeys during the construction phase of

the Proposed 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.

6.1.159 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 the Proposed Development 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.

6.1.160 As described earlier, it is considered that traffic and transportation 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 impacts will be provided should the proposed mitigation not fully address the impact of the Proposed Development on the transport network.

Air Quality

Baseline Conditions

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

6.1.162 The most recent publications for the local area are the 'Annual Report 2016 Air Quality in the Tees Valley 2012 – 2015' (Tees Valley Environmental Protection Group, July 2016) and the '2022 Air Quality Annual Status Report' (RCBC, June 2022). There are no AQMAs designated within the administrative boundary of RCBC or the adjoining local authority areas of Hartlepool Borough Council and Stockton-on-Tees Borough Council.

6.1.163 RCBC has one continuous monitoring station at a primary school in Dormanstown, located 4 km from the borough's two main historically industrial areas. The monitor is located inside the school grounds, in an area of relevant public exposure, and is regarded as a key site within the Tees Valley for monitoring industrial pollution and coastal ozone levels.

6.1.164 In 2014, RCBC implemented a network of 28 diffusion tubes in order to monitor nitrogen dioxide (NO_2) levels within the borough. In 2016, the network was reduced to 20 and reduced again to 16 in 2021. Reduction in the number of tubes has been justified by small concentrations of NO_2 at respective sites. Consideration of monitored NO_2 data is a useful proxy for the general local air pollution climate.

6.1.165 The available monitoring data presented in the 2022 Air Quality Annual Status Report indicates that the recorded annual mean concentrations are, generally, less than half of the annual mean objective of NO_2. The exceptions are at R27, West Lane, where an annualised and bias adjusted annual mean NO_2 concentration of 23.1 µg/m^3 is reported and R54, Ormesby Bank, where an annualised and bias adjusted annual mean NO_2 concentration of 30.5 µg/m^3 is reported. These sites are designated as roadside sites, where the ambient concentrations can be expected to be principally influenced by emission from road traffic. The 2022 Air Quality Annual Status Report indicates that no exceedances of the short-term (1-hour average) air quality objective for NO_2 were recorded by the Dormanstown automatic monitor.

6.1.166 Based on the monitoring data obtained by RCBC and reported in the 2022 Air Quality Annual Status Report, it is apparent that air quality in the populated areas of RCBC is generally very good.

6.1.167 In addition to local monitoring, AECOM undertook a three-month diffusion tube monitoring survey for baseline NO_2 to establish existing concentrations within the area and adjacent to the road network surrounding the Proposed Development. Following completion of the survey, the results were annualised to correct for seasonal variation and make them representative of the whole year.

6.1.168 The AECOM survey recorded NO_2 concentrations which exceeded the NO_2 annual mean objective at two sites, however the locations with elevated NO_2 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 limit value for NO_2, 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 NO_2 objective.

6.1.169 Another source of information on baseline air quality for the area in the vicinity of the Proposed Development is Defra background air quality maps (UK-AIR) (Defra, 2018). A summary of Defra background pollutant concentrations for the site are presented in Table 6-5.

Table 6-5: Background Air Quality concentrations from Defra background maps

OSGB x, y location (m)	NO_2	NO_X	PM_{10}	$PM_{2.5}$
456500, 456500	13.31	18.25	9.59	6.43
455500, 525500	17.06	24.51	9.76	6.52

https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

6.1.170 The existing air quality concentrations at designated habitat sites in the vicinity of the Proposed Development, and the existing acid and nutrient nitrogen deposition rates at those sites, will be obtained from the UK Air Pollution Information System (APIS), supplemented by data from UK-AIR.

Scope of the Assessment

6.1.171 There are a number of potential emissions to air that may be associated with the Proposed Development. Therefore, it is recommended **air quality is scoped into the future impact assessment**. These emission sources are summarised in the following sections.

Construction and Operational Emissions from Vehicles

6.1.172 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 limit values.

6.1.173 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. Screening criteria of 500 Light Duty Vehicles or 100 Heavy Duty Vehicles per day, is set out in the IAQM guidance document Land-Use Planning and Development Control Guidance (IAQM, 2017).

6.1.174 As operational amounts of daily traffic are predicted to be well-below these screening criteria, the operational impacts of traffic have been scoped out of this assessment. As outlined in the sub-section on 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 air quality modelling in or out of the assessment, particularly given the baseline described above.

6.1.175 Where the need for a detailed assessment is required, concentrations of NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) at sensitive receptors due to changes in traffic flows on the surrounding road network will be predicted using the ADMS Roads dispersion modelling software package.

Construction Dust and Mobile Plant

6.1.176 Construction phase dust impacts, and the level of recommended mitigation will be qualitatively assessed based on the framework approach outlined in the updated 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 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 350 m of the Proposed Development Site and ecological receptors within 50 m of the Proposed Development Site. An initial desk-based study of the site and surroundings has indicated that there are no receptors within the screening distances of The Main Site, however, as the Proposed Development includes construction of a hydrogen export pipeline and water and electrical connections it is likely that the construction works

for these aspects of the Proposed Development will warrant the need for a construction phase dust assessment.

6.1.177 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 NO_2 and PM_{10} 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 the vast majority of cases, they do not need to be quantitatively assessed. In this case, given the distance between the Main Site and the nearest residential property located approximately 1.3 km to the east (Marsh Farmhouse), emissions from on-site plant during construction is unlikely to generate a significant risk of effects on local air quality.

6.1.178 Emissions from NRMM associated with the Proposed Development will be temporary and localised and will 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, therefore, have been scoped out of this assessment.

Operational Emissions from the Production Facility

6.1.179 With the current design of the Proposed Development there would be no emissions to atmosphere as part of the normal operation with the potential to affect local air quality. The hydrogen is produced using an enclosed process using an offsite source of power and there would be no combustion processes to provide process heat or flaring on site.

6.1.180 Under abnormal circumstances requiring an emergency shutdown, a hydrogen gas vent, oxygen gas vent and emergency diesel generator may be utilised. Such an event would occur only in extreme circumstances and would not be a regular occurrence. The substances released to air (hydrogen and oxygen) would dissipate in the atmosphere and would not have the potential to affect local air quality. The potential for any unsafe conditions to occur at the time these releases occur, would be dealt with through the design process to ensure that adequate dispersion and dilution of emissions would take place. For these reasons, the local air quality effect of releases to air during an emergency shutdown will not be assessed as part of the EIA.

6.1.181 Based on this understanding, an assessment of operational emissions has been scoped out of the assessment.

Noise and Vibration

Baseline Conditions

6.1.182 The Main Site is remote from larger areas of residential receptors with the nearest residential noise sensitive receptor (NSR) to the Main Site being approximately 1.3 km to the east (Marsh Farmhouse).

6.1.183 The nearest residential settlement is the town of Redcar (approximately 2.2 km east of the Main Site), including the suburbs of Warrenby (approximately 1.3 km east of the Main Site), Dormanstown (approximately 1.9 km south-east of the Main Site), and Coatham (approximately 2.2 km east of the Main Site).

6.1.184 The nearest residential settlements to the Connection Corridors are Grangetown (approximately 140 m west of the Hydrogen Export Pipeline Corridor) and Dormanstown (approximately 90 m east of the Hydrogen Export Pipeline Corridor and Water Connection Corridor).

6.1.185 It is noted that there are areas of public/ private amenity close to the Proposed Development Site boundary, mainly to the north around Coatham. As outlined in more detail in the sub-section on Ecology and Nature Conservation, the Teesmouth and Cleveland Coast SPA/ Ramsar site and the South Gare and Coatham Sands SSSI are located immediately north of the Main Site.

6.1.186 Baseline sound data is available from the results of surveys which were undertaken in 2019 and 2020 for The NZT Project (immediately east of the Proposed Development Site). From an initial review of the available data the existing dominant sound in the area is from industrial and road traffic noise sources.

6.1.187 The results of the existing baseline sound surveys at human/residential NSRs will be discussed with consultees to determine if further monitoring is required for the EIA and to support the Environmental Permit application for the HyGreen Hydrogen Project. Baseline sound survey requirements at identified sensitive ecological receptors will be agreed in conjunction with the project ecologists and Natural England. It is 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 so as to not impact on the data gathered.

6.1.188 Consultation with RCBC will be undertaken in order to determine suitable specific NSRs. The extent of the Study Area has been defined to include the NSRs/ communities in each direction from each of the Main Site, Hydrogen Export Pipeline Corridor, Electrical Connection Corridor and Water Connection Corridor, that may be affected by noise or vibration during construction or operation of the Proposed Development.

Scope of the Assessment

6.1.189 There is the potential for the following impacts to be associated with the Proposed Development:

- Construction noise and vibration (including construction traffic on public roads); and
- Operational noise impacts from new plant, specifically at the Main Site.

6.1.190 Based upon the distance between the indicative Proposed Development Site boundary and the nearest NSRs, significant vibration impacts associated with operational activities are considered unlikely, although they will still be considered in brief as part of the EIA where an operational vibration pathway is identified.

6.1.191 As outlined in the sub-section on Traffic and Transportation, the Proposed Development is unlikely to have a significant effect on 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.

6.1.192 Operational activities within the Connection Corridors will consist only of the movement of materials within sealed conduits and occasional maintenance/security checks. Further, these Connection Corridors will be routed alongside existing similar connections, where practicable, and largely distant to identified NSRs. Therefore, it is considered that the effects of operational noise relating to the Connection Corridors would be negligible and a detailed assessment of the operational noise associated with the Connection Corridors is proposed to be scoped out.

6.1.193 Based upon the above, **noise and vibration will require scoping into the future impact assessment**. The scope of the noise and vibration assessment will comprise:

- Identification of the nearest NSRs (as outlined above);
- Liaison with consultees (including the RCBC Environmental Health Officer (EHO) and the project ecologists) to agree the scope and methodology of the noise and vibration assessment, including baseline sound monitoring locations (if required) and measurement protocol (monitoring procedures will conform to British Standard (BS) 7445);
- Establishment of baseline sound levels in the locality; and
- Assessment of the effects of predicted construction and operation noise and vibration impacts, associated with the Proposed Development, at the nearest NSRs (except where scoped out).

6.1.194 The noise and vibration assessments will be carried out with reference to the following policy and guidance documents:

- Department for Energy and Climate Change (DECC) (2011) overarching 'National Policy Statement for Energy' (EN-1);
- 'Noise Policy Statement for England' (NPSE) (2010); and
- PPG for 'Noise' (2019).

6.1.195 Additionally, reference will be made, but not limited to, the following:

- 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';
- 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';
- COPA 1974 (as amended);
- 'Calculation of Road Traffic Noise' (Department for Transport (DfT), 1988, "CRTN"); and
- DMRB LA111 (Revision 2)' (Highways England, 2020)

6.1.196 Noise levels associated with enabling and construction works will be calculated (at chosen NRSs) using the data and procedures given in BS 5228. Further detail of the likely construction works and construction working hours will be presented and will be used to inform the assessment of construction related impacts.

6.1.197 The need for prediction of vibration levels will be further considered depending upon the types of activities required during the construction of the Proposed Development. The assessment of vibration due to construction works may include the electrical and water connections and hydrogen export pipeline due to potential close proximity.

6.1.198 The construction of the Proposed Development may have a potentially significant impact on traffic flows on local roads around the Proposed Development Site. The change in road traffic noise levels during construction, at a selection of relevant NSR, will be predicted using the standard methodology outlined in the CRTN. The predictions will be based on baseline and with-construction traffic data provided as part of the proposed TA, as outlined in the sub-section on Traffic and Transportation of this EIA Scoping Report. The significance of changes in construction road traffic noise levels will be assessed based on a range of relevant guidance including the DMRB.

6.1.199 The assessment of operational sound will use computer noise modelling software (SoundPLAN or Cadna-A), based on information regarding plant layout, operating conditions and the levels of sound generated by plant items and vehicles, as provided by the design team. The modelling software enables a detailed representation of the proposed equipment and buildings, existing surrounding buildings and ground features to be created. The software implements the methodology in ISO 9613-2 for the calculation of sound levels from industrial sources. Any assumptions made whilst developing the noise modelling will be clearly outlined within the assessment and its technical appendices.

6.1.200 The significance of effects resulting from the predicted operational noise impacts of the Proposed Development will be assessed using the method given in BS 4142 and World Health Organisation (WHO) guidance (WHO, 2009). BS4142 provides a method for rating the acceptability of sound levels of an industrial nature at NSRs, 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.

6.1.201 Development 'Design and Impact Avoidance' measures will be included within the initial assessment of likely significant effects. These measures have not been fully defined for the Proposed Development however for construction this is likely to

include standard best practices approaches and for operation this is likely to be controlled by Environmental Permitting. Any remaining significant adverse effects will be minimised and mitigated where possible through adoption of further specific mitigation. Following the implementation of further specific mitigation, any residual effects on NSRs remaining will be identified and reported in the EIA.

Socio-Economics and Land-Use

Baseline Conditions

6.1.202 Baseline conditions are defined for the socio economics study area against England as a whole. 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.

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

- HyGreen Study Area[6];
- Middlesbrough and Stockton Travel To Work Area (TTWA); and
- England.

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

- Population Estimates (Office for National Statistics (ONS), 2020);
- Census 2021 (ONS, 2022);
- Census 2011 (ONS, 2012);
- Indices of Multiple Deprivation (MHCLG, 2019); and
- Business Register and Employment Survey (ONS, 2021).

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

Population

6.1.206 The HyGreen study area is located in the local authority of Redcar and Cleveland, in the North East of England.

6.1.207 The population of the HyGreen Study Area was 1,356 in 2021 (ONS, 2022), which accounted for approximately 0.3% of the population of Middlesbrough and Stockton TTWA (ONS, 2020). In the HyGreen Study Area, 59.3% of the population are of

[6] The Lower Layer Super Output Area (LSOA) of E01012107: Redcar and Cleveland 003D.

working age, which is slightly lower than national averages and the TTWA average. The proportion of elderly people (65+ years) in the HyGreen Study Area (19.4%) is in line with that for the TTWA (19.7%), and nationally (18.5%), implying a similar dependency ratio in the HyGreen Study Area. This can be seen in

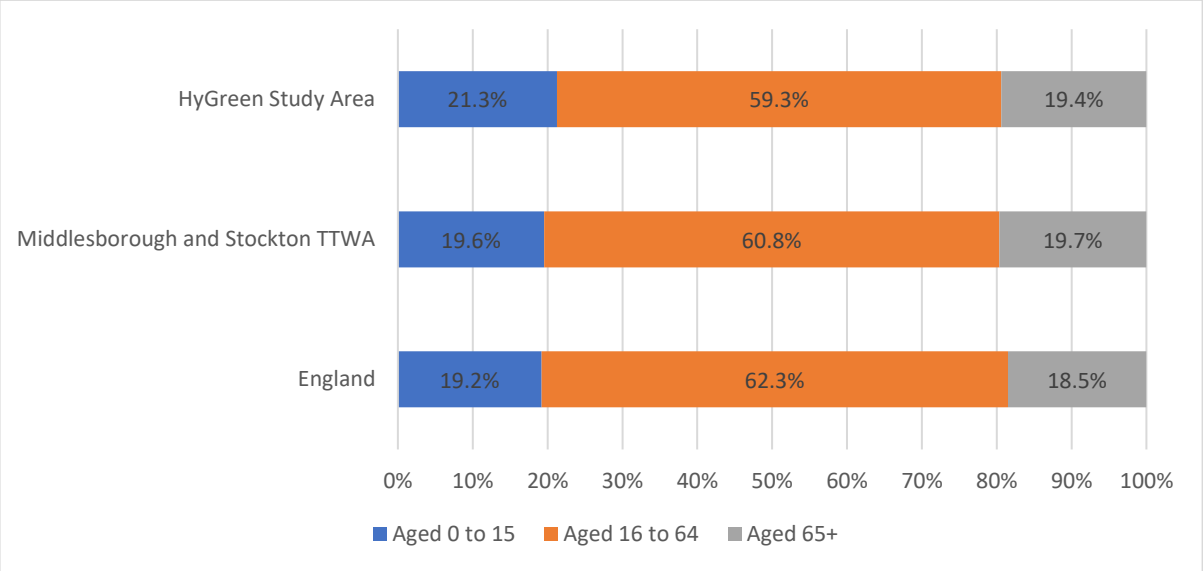

Figure 6-1.

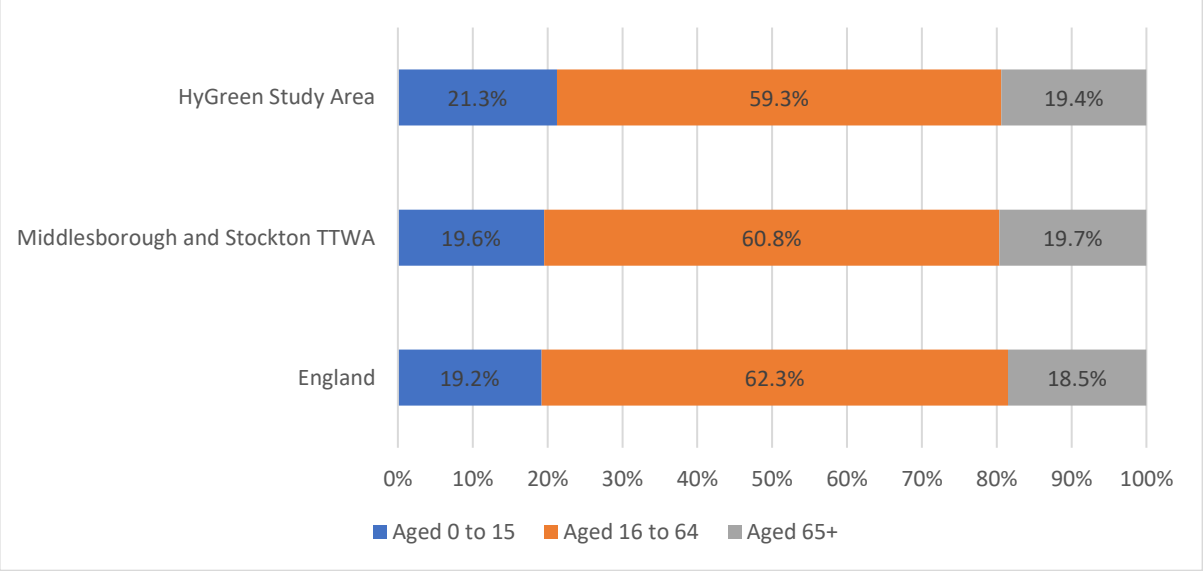
HyGreen Study Area
21.3%
59.3%
19.4%
Middlesborough and Stockton TTWA
19.6%
60.8%
19.7%
England
19.2%
62.3%
18.5%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Aged 0 to 15
Aged 16 to 64
Aged 65+

Figure 6-1: Population Age Breakdown

Economic Activity

6.1.208 Census 2011[7] data shows that in the HyGreen Study Area, approximately 57.8% of the working age population are economically active, with 27.8% of the working age

[7] Census 2021 data concerning economic activity has not yet been released. This is the most recent dataset available at LSOA level geography.

population in full time employment (ONS, 2012). Rates of economic activity are lower than the TTWA area (65.6%) and nationally (64.9%). Of the economically active, approximately 8.0% are unemployed in the HyGreen study area, compared to 6.4% in the TTWA and 9.1% nationally. Retirement is the most common form of economic inactivity in the HyGreen Study area.

Deprivation

6.1.209 The HyGreen Study Area lies within an area of relative deprivation. The Lower Layer Super Output Area (LSOA) within the Study Area is within the top 10% most deprived LSOAs in England. More widely, deprivation is prevalent in the local authority in which the HyGreen Study Area resides in, as Redcar and Cleveland is ranked the 40th most deprived local authority nationally.

Employment by industry

6.1.210 In the HyGreen Study Area, transport and storage (including postal) is the largest employment industry (28.7% of employment) and represents a significantly larger proportion than in the TTWA (6.2%) and nationally (5.2%). This is followed by manufacturing (22.9%), again a much higher representation than in the TTWA (8.7%) and England as a whole (7.3%). The third largest employment industry is business administration and support services which makes up 20.1% of employment, a larger share than in the TTWA (7.7%) and nationally (8.9%). In contrast, the retail, education, and health sectors make up a significantly smaller proportion of employment in the Study Area compared to the comparators. This can be seen in Figure 6-2 below.

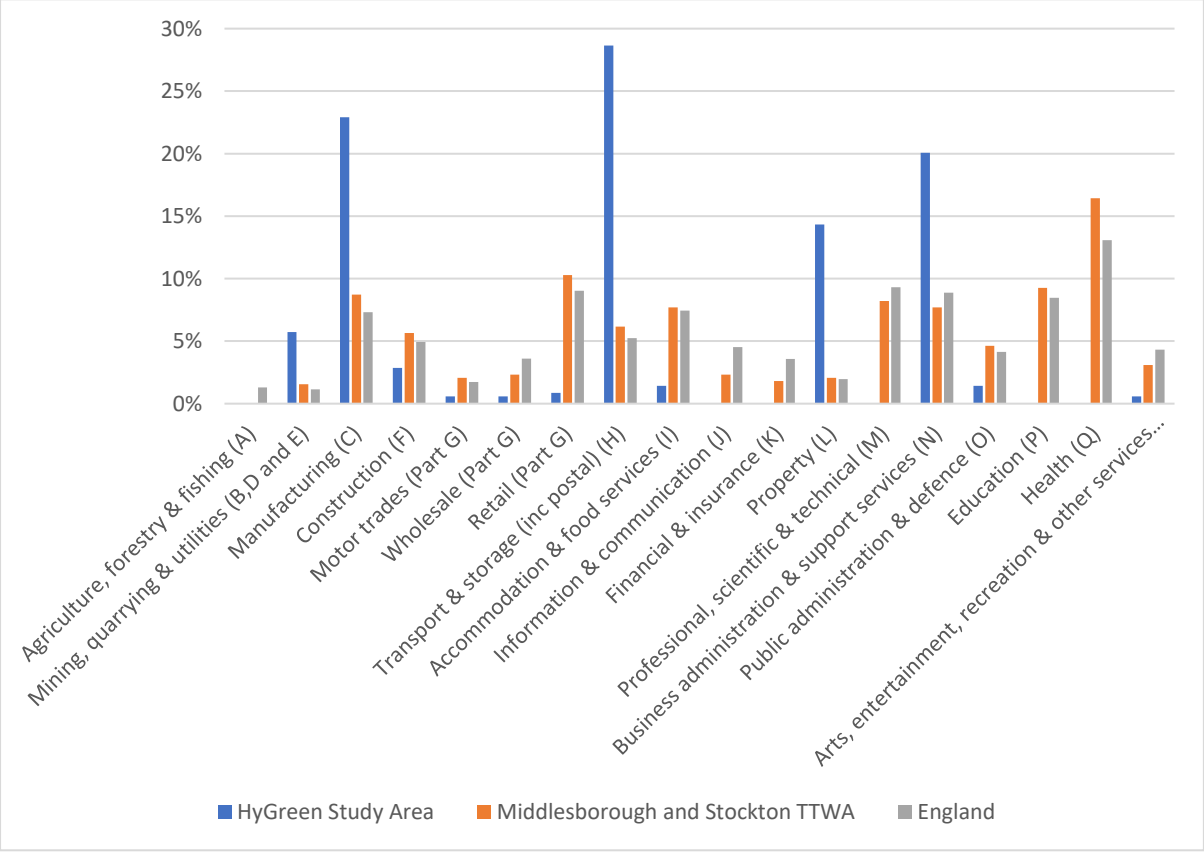

Figure 6-2: Employment by Industry

Land Use

6.1.211 The Proposed Development Site is located within a largely urban area, consisting of existing and former sites of industrial installations south of the River Tees. The Main Site is located on the former site of the materials handling area and associated plant for the neighbouring coke ovens and blast furnace of the Redcar Steelworks. The Connection Corridors are mostly located on or adjacent to former and current industrial land, within and across a combination of hardstanding, road networks and railway tracks, surrounded by informal vegetation. Agricultural land is not present across the majority of the Proposed Development Site, and where agricultural land is present it is not under agricultural land use (see Section 8 for further details).

Scope of the Assessment

6.1.212 The potential effects anticipated during the construction and operation 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;
- Impacts on businesses either direct or indirect via in combination effects identified by other discipline assessments; and
- Any land use impacts (such as effect on planned or proposed developments).

6.1.213 The majority of the Proposed Development Site will be comprised of industrial land, so will not be experiencing a large change in use. The land use impacts would not result in any significant effects to agricultural land holdings due to the nature of the area. See Section 8 which also explains that agricultural land is not present across the majority of the Proposed Development Site, and where agricultural land is present it is not under agricultural land use and any impacts to this land are expected to be temporary.

6.1.214 Potential disruption to traffic on the local and strategic road networks and PRoWs during construction will be covered in the traffic and transportation assessment.

6.1.215 Considering the above, the Proposed Development could have **beneficial and adverse socio-economic and land use impacts that require scoping into the future impact assessment**. The approach to assessing the socio-economics effects will be based on a proven and robust approach used for assessments of a similar nature.

6.1.216 The socio-economic assessment will consider existing site conditions, policy context and the baseline situation relating to the Proposed Development Site (using the appropriate study area) against established national and local policy standards and best practice benchmarks.

6.1.217 The ES chapter will include a review of relevant policy at the local and national levels to identify the key issues of relevance to the Proposed Development. This will include socio-economic policy for the Proposed Development and the contribution of these activities to the socio-economic policy objectives of RCBC, TVCA, and STDC.

6.1.218 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.

6.1.219 The assessment will consider the likely direct and indirect socio-economics impacts for each phase of the Proposed Development. It will draw on other assessments where necessary. The assessment will be carried out using a number of recognised data sources, and wherever possible the impacts of the socio-economic assessment will be appraised against relevant national standards such as those provided by HM Treasury and the Homes and Communities Agency (HCA). Where relevant standards do not exist, professional experience and expert judgement will be applied and justified.

6.1.220 Mitigation measures (some of which may have already been considered through the development of the Proposed Development) will be considered and key indicators for monitoring socio-economics impacts moving forward will be established. This may include:

- A Skills and Employment Plan (or similar) to be submitted with the planning application; and
- Targets for the proportion of construction and operation staff to be employed from within specified distances of the Proposed Development Site.

Major Accidents and Disasters

Baseline Conditions

6.1.221 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 which includes the Production Facility. For the purposes of EIA Scoping, a high-level review of installations and potential receptors in close proximity to the Proposed Development Site has been undertaken and an initial list is illustrated on Figure A-7: Major Accidents and Natural Disasters Key receptors (Appendix A).

6.1.222 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.

6.1.223 The COMAH Regulations may be applicable to the Proposed Development and will be determined via a calculation to be carried out in accordance with the methodology contained within Schedule 1, Part 3 of the Regulations, commonly referred to as an aggregation calculation. This calculation is required as there is no single dangerous substances which will be present in a quantity equal to or above the relevant COMAH qualifying quantities. The aggregation calculation incorporates the contribution of all dangerous substances present on the site which are listed in

Parts 1 and 2 of Schedule 1 of COMAH to determine whether the Regulations will apply to the establishment.

6.1.224 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);
- Health and Safety Executive's (HSE's) COMAH 2015 Public Information Search (HSE, 2015);and
- Google aerial and street view maps covering the study area (Google, 2020).

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

Environmental Baseline of Relevance to MA&Ds

6.1.226 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.

6.1.227 Teesside has a temperate oceanic climate typical of the UK. Past 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 the sub-section on Surface Water, Flood Risk and Water Resources, there are areas of the Proposed Development Site within Flood Zones 1, 2, and 3, with respect to tidal/fluvial flood risk due to its position on the estuary.

Infrastructure and Industrial Sites

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

6.1.229 There are currently a number of 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.

6.1.230 Due to the nature of industry in Teesside, there is an existing network of buried pipelines present in the vicinity of the Proposed Development, including major hazard pipelines regulated in accordance with the PSR (1996).

6.1.231 In the vicinity of the Proposed Development there is also significant infrastructure associated with the transmission and distribution of energy including high voltage (HV) 400 kV overhead power lines.

6.1.232 Transport infrastructure in the area includes ports, road and railway lines. Teesport, approximately 1 km from the Main Site, 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, Redcar and South Bank train stations and their associated rail lines also fall within the study area. Teesside Airport is the nearest airport, 18 km from the Proposed Development Site.

6.1.233 The nearest residential areas to the Main Site include areas within the districts of Middlesbrough and Redcar and Cleveland, such as Lackenby and Dormanstown. The estimated total populations of Middlesbrough and Redcar and Cleveland are 143,900 and 136,500 respectively (ONS, 2022).

Sensitive Environmental Receptors of Relevance to MA&Ds

6.1.234 The following sensitive receptors which could be vulnerable to a MA&Ds risk 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;
- 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.

Definition of MA&Ds

6.1.235 A major accident is defined within guidance (IEMA, 2020) as an event such as a train derailment or major road traffic accident that threatens immediate or delayed serious environmental effects to human health, welfare and/ or the environment, and requires the use of resources beyond that of the applicant to manage.

6.1.236 A disaster is an anthropogenic incident such as an act of terrorism or a natural hazard such as an earthquake with the potential to cause an event or situation that meets the definition of a major accident.

Summary of Current MA&Ds Risks

6.1.237 The location of the Proposed Development is within an area which has a number of 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.

Scope of the Assessment

6.1.238 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.

6.1.239 Additionally, the Applicant has an existing Operating Management System (OMS), which is a systematic framework designed to sustainably deliver safe, reliable, and compliant design and operations in relation to safety. The Applicant is committed to strong HSE performance through:

- i) complying with applicable UK legislation; and
- ii) developing and following strict company HSE policies and procedures.

6.1.240 The Applicant's OMS and associated policies and procedures provide a framework to ensure management of major hazards. This and existing hazard management studies will underpin the MA&D assessment within the EIA.

6.1.241 MA&Ds scenarios will be considered for the lifecycle of the Proposed Development, including construction and operation phases.

6.1.242 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 the Proposed Development 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;
- 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; and
- 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.

6.1.243 A long list of potential MA&Ds categories is presented in Appendix B and includes the initial assessment used to determine if further assessment is required. This is supported by early safety studies already developed by the Applicant such as the HAZID (Hazard Identification) multidiscipline review workshop. From this list, MA&Ds

which are considered very unlikely to occur (for example due to the location of the Proposed Development) have been scoped out. Furthermore, any hazards for which there is no credible source-pathway-linkage have also been scoped out.

6.1.244 **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.

6.1.245 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.

6.1.246 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.

6.1.247 The key substances which will be present at the Production Facility include the following:

- Hydrogen gas (H_2), which is classified as extremely flammable. If released, this could result in a fire and/ or explosion.
- Oxygen (O_2), generated as a by-product of the water electrolysis, is classified as an oxidant, therefore can cause or intensify a fire if in contact with combustible materials.
- Dependant on the technology used, process operations may include potassium hydroxide (KOH) to be contained within the alkaline electrolyser system and required for maintenance. The expected quantities present would be between 67.5 m^3 and 135 m^3 of 30% KOH. This substance at this concentration is classified as corrosive and as an irritant; therefore, in the event of an accidental release there is the potential for harm to persons on site. However, this would not reach the criteria for a MA&D scenario and therefore can be scoped out.
- Also dependant on the technology used, process operations may include glycol used in the primary cooling process. The quantities to be stored on the Main Site are considered to be relatively minor (1 m^3 of 100% glycol), and treatment of the water via acid dosing to manage pH is available if required. It is considered a release would not be a credible MA&Ds scenario and can be scoped out. .
- Substances present on site may be contained within the effluent generated by process operations. In the event of a failure of effluent treatment systems, there is the potential for a release to the environment. However, the concentrations of these substances, which are not categorised as being especially hazardous to the environment in their own right, would be at a very low level. Consequently, such a release would not constitute a MA&D scenario and can be scoped out.
- Substances will be used to treat water and effluent generated by process operations such as biocides. The quantities to be stored on the Main Site are expected to be relatively minor (approximately a small number of tonnes present

on site) therefore a release would not be a credible MA&Ds scenario and can be scoped out.

- Diesel will be used on the Main Site for fuel in backup generators. This 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. Other combustible substances expected to be present, such as glycol, have a high flashpoint and are therefore non-flammable. Therefore, this can be scoped out of the assessment.
- 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.
- Systems which during operation would contain hydrogen would be vented and purged with an inert gas such as nitrogen to ensure no flammable material remains prior to decommissioning.
- In the event of a major fire at the Proposed Development, which caused a loss of containment of the stored substances described in this section, the composition of fire water may potentially include substances harmful to the environment (e.g. diesel). The respective quantities or concentrations of these substances would be below the criteria to constitute a MA&D scenario as outlined above. Fire water containment systems will be installed as part of the Proposed Development, Which will prevent this material from reaching the environment.

6.1.248 The pipeline corridors associated with the Proposed Development will contain hydrogen (H_2) delivered to offtakers within the Teesside industrial area. The technology used for the manufacture of hydrogen (H_2) from electrolysis of water is well established and the equipment to be used will be designed and constructed to precise industry standards. The Production Facility will be subject to rigorous safety and be required to comply with environmental regulations.

6.1.249 The operators of facilities to produce and transport hydrogen are required to demonstrate integrity via the submission of Safety Case documentation. For the Proposed Development, a Safety Case will be required for the Hydrogen Export Pipeline Corridor and may be required for the Production Facility pending the outcome of the COMAH applicability aggregation calculation.

6.1.250 The Proposed Development will be regulated through consents and licences such as Hazardous Substances Consent, Pipelines Safety Regulations, COMAH, and Environmental Permitting Regulations. These regulatory regimes will demand appropriate systems, controls and management procedures to safeguard workers, and off-site receptors including the public and the environment. 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.

6.1.251 MA&D categories associated with the Proposed Development during construction include the potential for accidental contact by workers with high voltage electricity, supplied to the Main Site via transmission networks for connection to the electrolysis equipment, and hazards associated with any potential simultaneous operations such as installation of pipework in existing pipeline corridors.

6.1.252 MA&D categories associated with the Proposed Development during operation are fire and explosion. These are credible accident scenarios which have a low probability of occurrence and significant consequences. These scenarios mainly relate to the generation, storage and transfer via pipeline of gaseous hydrogen (H_2).

6.1.253 For those MA&Ds category types which have been scoped in for detailed assessment in the EIA, the following assessment process 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 ALARP; and
- qualitative consideration of the significant risks of any residual risk.

Materials and Waste

Baseline Conditions

6.1.254 The study areas for the materials and waste assessment are 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).

6.1.255 The Proposed Development Site lies within the Redcar and Cleveland Local Authority, and the Yorkshire and the Humber region.

6.1.256 Baseline data within the Proposed Development Site has been reviewed to date for:

- Impacts on allocated/safeguarded mineral and waste sites within the Proposed Development Site;
- 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 Minerals Safeguarding Areas (MSAs) for salt and anhydrite within the Proposed Development Site.

6.1.257 Additional baseline information will be gathered and presented in the ES for:

- Construction and operational waste generation within the Proposed Development Site;
- Use of construction materials within the Proposed Development Site;
- Non-hazardous and inert construction and operational waste management within the Yorkshire and the Humber region;
- Hazardous waste construction and operational waste management within England; and
- Availability of key construction materials nationally and within the Yorkshire and the Humber region.

6.1.258 An initial review of baseline conditions within, or overlapping the boundary of, the Proposed Development Site has been undertaken and consists of:

- Historic landfill sites (Redcar Trunk Road Landscaping, West Coatham Lane, Mushroom Grove Allotments and Perimeter Mounds / Perimeter of Wilton Works) and permitted landfill sites (Bran Sands Landfill, Wilton, Perimeter Mounds (four areas of landfill)) within the Proposed Development Site as shown in the Environment Agency's (EA) Historic Landfill Sites (EA, 2021a) and Permitted Waste Sites – Authorised Landfill Site Boundaries data sets (EA, 2021b);
- Historic landfill sites (Redcar Complex) and permitted landfills (Warrenby Landfill) adjacent to the Proposed Development site;
- A number of permitted waste sites and waste site applications as outlined in the EA's Environmental Permitting Regulations – Waste Sites (EA, 2022). The sites are not safeguarded;
- A MSA for gypsum (anhydrite) and salt in the Redcar and Cleveland Local Plan area (Redcar and Cleveland Borough Council, 2018); and
- A General Location for Large Waste Management Facilities, this covers industrial areas including the Proposed Development Site to the south of the River Tees (Tees Valley, 2011a).

Scope of the Assessment

6.1.259 The assessment will follow the methodology set within the IEMA Guidance (IEMA, 2020).

6.1.260 For the purpose of this EIA Scoping Report, materials and waste comprise:

- The consumption of materials (key construction materials only); and
- The generation and management of solid waste.

6.1.261 Materials are defined in the IEMA Guidance (IEMA, 2020) 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."*

6.1.262 Other material assets considered include built assets such as landfill void capacity and allocated/safeguarded mineral and waste sites.

6.1.263 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."*

6.1.264 The IEMA Guidance (IEMA, 2020) 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.

6.1.265 The IEMA guidance (IEMA, 2020) *"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.

6.1.266 The assessment of materials and waste will take into account that:

- 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 permitted facility for further treatment or disposal;
- Facilities transferring, treating or disposing of waste must be either permitted or apply for an exemption, 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
- Minerals Planning Authorities (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.

6.1.267 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 chains, which are potentially in different regions of the UK or the world and therefore 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 (note, the use of construction materials is scoped into the assessment).
- 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. Only impacts on allocated/safeguarded sites such as quarries and wharfs are assessed. MSAs are included for context in the baseline since MSAs are a planning consideration. The Proposed Development Site uses previously developed industrial land. The Proposed Development Site 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) and part of the anhydrite has been removed by mining by Imperial Chemical Industries prior to the 1970s (Mindat, 2023).
- Direct impacts on allocated/safeguarded mineral and waste sites. There are no allocated/safeguarded mineral sites in the Proposed Development Site. Whilst there is a General Location for Large Waste Management Facilities which covers industrial areas to the south of the River Tees (Tees Valley, 2011a), there are no allocated/safeguarded waste sites in the Proposed Development Site.
- Effects on the availability of materials during operation: forecast effects are (using professional judgement) considered negligible in relation to the scale and nature of the Proposed Development.

6.1.268 Due to the uncertainty about the nature of mitigation and the method by which mitigation 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.** Table 6-6 provides a summary of the matters to be scoped in and out of the assessment.

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

Proposed Development phase	Effects	Scope in/out
Construction	Changes in demand for materials	Scope in
	Changes in available landfill void capacity	Scope in
	Changes to allocated/safeguarded mineral sites	Scope out
	Changes to allocated/safeguarded waste sites	Scope out
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

6.1.269 The sensitive receptors for the assessment are:

- Landfill void capacity in the expansive study areas of Yorkshire and the Humber (non-hazardous landfill void capacity) and England (hazardous landfill void

capacity). As defined in the IEMA Guidance *"landfill is a finite resource, and hence – through the ongoing disposal of waste – there is a continued need to expand existing and develop new facilities. This requires the depletion of natural and other resources which, in turn, adversely impacts the environment."*

- National consumption of key construction materials. As outlined in the IEMA Guidance, *"materials are, in their own right, sensitive receptors. Consuming materials impacts upon their immediate and (in the case of primary material) long-term availability; this results in the depletion of natural resources and adversely impacts the environment."*

6.1.270 The assessment criteria for determining sensitivity, magnitude and significance as set out by the IEMA Guidance will be used in the assessment.

6.1.271 The sensitivity of receptors and magnitude of impacts from materials and waste will be assessed through the following:

Materials

- Establishing the baseline for national and regional consumption of key construction materials by weight;
- Assessing the sensitivity of materials as related to the availability and types of materials to be consumed by the Proposed Development in construction;
- Establishing the quantities of key construction materials required for the construction of the Proposed Development; and
- Comparing the total quantities of key construction materials with the most recent national and regional consumption (utilising a percentage approach).

Waste

- Establishing the baseline landfill void capacity in the non-hazardous (including inert) and hazardous waste study areas;
- Assessing the sensitivity of landfill void capacity;
- Establishing the quantities of construction, demolition and excavation waste to be generated during the construction of the Proposed Development;
- Establishing the quantities of waste to be generated during the operation of the Proposed Development; and
- Comparing the total waste arising from the construction of the Proposed Development against the landfill void capacity (utilising a percentage approach).

Human Health

Baseline Conditions

6.1.272 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 Scoping Report. A human health profile will be developed for the ES which focuses on key indicators identified by Public Health England 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 to ensure that it is a consolidated baseline.

6.1.273 The Proposed Development Site intersects three wards in the local authority of Redcar and Cleveland: Dormanstown, Grangetown, and South Bank. Indicators deemed relevant to likely health impacts of the Proposed Development for each area (collectively known as the Study Area) have been identified, with data relating to these and the comparative geographies set out in Table 6-7.

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

- Census 2021 (ONS, 2021); and
- Public Health England (2022).

6.1.275 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 ES.

Table 6-7: Human Health Baseline Indicators

Indicators	Study Area	Redcar and Cleveland	England
Population aged under 16 (%) (2021)	24.5	17.7	18.6
Population aged 65+ (%) (2021)	14.1	23.3	18.4
Unemployment rate (%) (2021)	5.6	3.6	3.5
General health – good or very good (%) (2021)	75.6	76.5	82.2
General health – bad or very bad (%) (2021)	8.8	7.6	5.2
Life expectancy at birth (female) (years) (2016-20)	78.3	81.5	83.2
Life expectancy at birth (male) (years) (2016-20)	73.3	77.6	79.5
Obese adults (%) (2020/21)	-[8]	33.4	25.3
Obese children (reception year) (%) (2020/21)	14.8	12.0	9.9
Smoking prevalence in adults (%) (2021)	-[8]	13.3	13.0
Mortality rate from Chronic Obstructive Pulmonary Disease (COPD) (2017-19)	-[8]	79.6	52.8

[8] Please note data at ward level is unavailable from Public Health England.

Scope of Assessment

6.1.276 The ES chapter will identify the communities that will 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, Teesside and wider area if required, as a consequence of the Proposed Development.

6.1.277 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.

6.1.278 In November 2022, the Institute of Environmental Management and Assessment (IEMA) published new guidance on assessing human health as part of EIA (IEMA, 2022a; 2022b). Previous to this, there was no consolidated methodology or practice for the assessment of effects on human health. 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.

6.1.279 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, so scoping identifies whether health effects are 'potentially significant' or not. Therefore, the anticipated potential impacts during construction and operation which could be potentially significant include the following determinants:

- Open space, leisure, and play;
- Transport modes, access, and connections;
- Education and training;
- Employment and income;
- Climate change mitigation and adaptation;
- Air quality;
- Land quality;
- Noise and vibration; and
- Health and social care services.

6.1.280 The following determinants have been scoped out of this assessment:

- Diet and nutrition;
- Housing;
- Relocation;
- Radiation;

- Physical activity;
- Risk taking behaviour;
- Community safety;
- Community identity, culture, resilience, and influence;
- Social participation, interaction, and support;
- Built environment; and
- Wider societal infrastructure and resources.

6.1.281 Other relevant EIA technical topics will also inform the human health assessment. These are as follows:

- Socio-Economics and Land Use;
- Air Quality;
- Noise and Vibration;
- Traffic and Transportation; and
- Climate Change.

Climate Change

Baseline Conditions

6.1.282 The baseline conditions for the climate change assessment, particularly the greenhouse gas (GHG) assessment, will be a business-as-usual scenario whereby the Proposed Development does not proceed, for those lifecycle stages scoped into the assessment.

6.1.283 The baseline comprises existing carbon stock and sources of GHG emissions within the Proposed Development Site boundary, as well as the emissions that may be avoided as a result of the Proposed Development, predominantly (but not limited to) existing emissions from the combustion of fossil fuels that may be replaced by the hydrogen generated in the Proposed Development over its operational lifetime.

6.1.284 The current baseline for the Climate Change Resilience (CCR) assessment will examine historic Met Office climate data for the Proposed Development Site to identify previous climate hazards that may impacts the site. The future baseline will be developed using selected climate parameter data, including forecast changes in precipitation and air temperatures, from the UK Climate Projections 2018 (UKCP18) for the 25km^2 grid square within which the Proposed Development is located.

6.1.285 Table 6-8 presents historic climate data for the Proposed Development Site. This is used to determine the current baseline.

Table 6-8: Met Office Climate Data Baseline (1981 to 2010)

Climate Variable	Nearest Climate Station (Stockton-on-Tees)	District: England East and North East
The average annual maximum daily temperature (°C)	13.09	12.63
The average annual minimum daily temperature (°C)	5.18	5.21
The warmest month on average, temp (°C)	July (20.35)	July (15.49)
The coldest month on average, temp (°C)	December (0.68)	Feb (0.60)
The mean annual rainfall levels (mm)	1360.04	1073.86
The wettest month on average, (mm)	August (60.62)	November (76.98)
The driest month on average, (mm)	February (32.85)	May (51.59)

6.1.286 Table 6-9 and Table 6-10 presents climate variable data for the Proposed Development Site extracted from UKCP18 forecasts. This data forms the future baseline for the climate assessment.

Table 6-9: Air Temperature Data UKCP18

Climate variable	2010-2039		2040-2069		2070-2099	
Mean annual air temperature anomaly at 1.5 m (°C)	0.67		1.69		3.28	
	0.22	1.15	0.82	2.61	1.83	4.87
Mean summer air temperature anomaly at 1.5 m (°C)	0.81		2.08		4.28	
	0.19	1.43	0.86	3.39	1.99	6.64
Mean winter air temperature anomaly at 1.5 m (°C)	0.8		1.47		2.74	
	-0.07	1.28	0.39	2.62	0.95	4.68
Maximum summer air temperature anomaly at 1.5 m (°C)	0.81		2.20		4.69	
	0.08	1.56	0.70	3.77	1.84	7.51
Minimum winter air temperature anomaly at 1.5 m (°C)	0.63		1.59		2.95	
	-0.08	1.37	0.33	2.99	0.86	5.32

Table 6-10: Precipitation Data UKCP18

Climate variable	2010-2039		2040-2069		2070-2099	
Mean annual precipitation (%)	1.50		-1.75		-0.05	
	-1.79	5.19	-7.43	4.22	-7.24	7.45
Summer precipitation rate anomaly (%)	-1.43		-13.41		-25.20	
	-14.31	11.67	-30.91	4.81	45.50	3.25
Winter precipitation rate anomaly (%)	3.26		7.20		15.90	
	-4.68	12.23	-3.60	20.38	-1.05	36.65

Scope of the Assessment

6.1.287 It is considered that the Proposed Development will represent a step forward in the implementation of large-scale green hydrogen production for use as a fuel source, that could make a significant contribution to reducing the CO_2 emissions from the power sector and other industry. Therefore, **the climate change topic will be scoped into the future impact assessment.**

6.1.288 The climate change ES chapter will consist of three separate assessments:

- Lifecycle GHG assessment: an assessment of the impact of GHG emissions as a result of the Proposed Development on the climate,
- CCR Assessment: an assessment of the resilience of the Proposed Development to the impact of future climate change; and
- In-combination Climate Impact (ICCI) assessment: an assessment of the combined impact of climate change and the Proposed Development on receptors in the surrounding environment.

GHG assessment

6.1.289 The GHG assessment will draw on IEMA guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022c) and align with 'PAS 2080 Carbon Management in Infrastructure'. The assessment will calculate and report GHG emissions at each stage in the project lifecycle including the materials, construction and operation stages.

6.1.290 Mitigation measures will be identified to reduce the impact of the Proposed Development throughout the lifecycle. Measures considered could include the choice of materials with lower embodied carbon during construction, the use of lower-carbon construction techniques, and improved efficiency during operation.

6.1.291 In line with IEMA guidance, the magnitude of GHG emissions from the Proposed Development will be put into context by presenting them in terms of their contribution to national and sectoral carbon budgets.

6.1.292 The significance of the effect will be assessed by identifying the Proposed Development's compatibility with the UK's budgeted 1.5°C net zero trajectory, the extent to which is complies with policy on climate change and the appropriateness of mitigation to be implemented.

6.1.293 To provide further context on how the Proposed Development aligns with national policy on net zero, a discussion of the GHG emissions from the energy sector in the UK will be provided. The GHG emissions from comparable energy sources, including (but not limited to) natural gas, grey (unabated) hydrogen and blue hydrogen production with the same capacity of the Proposed Development will be described and compared with those from the Proposed Development.

CCR assessment

6.1.294 The CCR assessment will consider the resilience of the Proposed Development to climate change impacts. It will identify current and future climate hazards and consider the likelihood and consequence of their occurrence to understand the

significance of the effect on the Proposed Development. Appropriate measures to mitigate the impacts of climate change will be identified.

ICCI assessment

6.1.295 The ICCI assessment will consider the combined impact of climate change and the Proposed Development on receptors in the surrounding environment as identified in the topic assessment chapters. As with the CCR assessment, the ICCI assessment considers the likelihood and consequence of climate change impacts on the receptors to identify the level of significance of effect. Where necessary appropriate measures to mitigate the impact of climate change on a receptor will be identified.

Cumulative and Combined Effects

Cumulative Effects

6.1.296 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.

6.1.297 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.

6.1.298 A number of other proposed developments have been identified in the vicinity of the Proposed Development Site that could potentially result in cumulative effects impacts 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 A-7: Other Developments to be considered in the Cumulative Effects Assessment (Appendix A).

6.1.299 The Applicant will consult with RCBC and other neighbouring LPAs in order to define the full list of current and future developments / projects to be considered.

H2Teesside

6.1.300 H2Teesside is another project lead by the Applicant which is in the early stages of design and planning. It comprises the construction, operation, and maintenance of a 1.2 GW (Phase 1 600 MW and Phase 2 600 MW) CCS enabled Hydrogen Production Facility, located in the Teesside industrial cluster area. This will also be located within land owned by Teesworks (known as 'The Foundry') in Redcar and Cleveland, with the connection corridors extending further into Stockton-on-Tees and Hartlepool, all within the Tees Valley. The production facility for H2Teesside is likely to be located in close proximity to the Main Site for the Proposed Development. The project is currently at pre-planning stage and following the obtaining of a section 35 Direction, is development which requires development consent under the Planning Act 2008.

Net Zero Teesside

6.1.301 NZT is a proposed full chain CCUS project, comprising a CO_2 gathering network, including CO_2 pipeline connections from industrial facilities on Teesside to transport the captured CO_2; a CCGT electricity generating station with an abated capacity circa 850 MW output (gross), cooling water, gas and electricity grid connections and CO_2 capture; a CO_2 gathering/booster station to receive the captured CO_2 from the gathering network and CCGT generating station; and the onshore section of a CO_2 transport pipeline for the onward transport of the captured CO_2 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.

6.1.302 The project requires a DCO to enable its construction and operation. The examination period closed 10th November 2022 with a decision expected in May 2023.

Tees Combined Cycle Power Plant

6.1.303 Tees Combined Cycle Power Plant (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 Development Consent Order (DCO) application was approved in April 2019 but is understood to be undergoing an amendment. It is expected that construction will begin in 2024, with the generating station becoming operational in 2027.

Tees Valley Lithium Project

6.1.304 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 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.

Woodsmith Project

6.1.305 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 the Main Site for the Proposed Development.

6.1.306 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. The associated Materials Handling Facility will be located in the east of the Wilton International Site. The Materials Handling Facility and the Harbour Facilities will be linked by an overland conveyor.

MGT Teesside Tees Renewable Energy Plant (REP)

6.1.307 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 for the Proposed Development.

6.1.308 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)

6.1.309 REC is a proposed 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 for the Proposed Development. A planning application for REC was submitted in August 2020 and granted in January 2021; it is anticipated that construction will begin within approximately 15 months of the decision date.

CBRE Anaerobic Biogas Production Facility

6.1.310 In July 2016, CBRE submitted a planning application for an anaerobic biogas production facility and combined heat and power (CHP) plant, south-east 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.

STDC Projects

6.1.311 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.

Combined Effects

6.1.312 Combined effects may occur where several different effects from a single development (i.e. the Proposed Development) collectively cause an effect / effects of greater significance upon a particular environmental receptor.

6.1.313 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 (EIA) PROCESS

EIA Methodology and Reporting

7.1.1 The EIA will be carried out in accordance with the requirements defined by the EIA Regulations.

7.1.2 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.

7.1.3 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.

7.1.4 The EIA is based on a number of related activities, as follows:

- establishing existing baseline conditions;
- consultation with statutory and non-statutory consultees;
- 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
- professional judgement.

7.1.5 Impacts will be considered on the basis of their magnitude, duration and reversibility. Cumulative and combined effects will also be considered where appropriate. Significance of effects 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'.

7.1.6 Where likely significant environmental effects are identified in the assessment process, measures to mitigate these effects will be put forward in the form of recommendations to be undertaken as part of the project development.

Structure of the Environmental Statement (ES)

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

7.1.8 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: Environmental Statement (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;
  - Surface Water, Flood Risk and Water Resources;
  - Geology, Hydrogeology and Contaminated Land;
  - Ecology and Nature Conservation;
  - Landscape and Visual Amenity;
  - Cultural Heritage;
  - Traffic and Transportation;
  - Air Quality;
  - Noise and Vibration;
  - Socio-Economics and Land-Use;
  - Major Accidents and Disasters;
  - Materials and Waste;
  - Human Health;
  - Climate Change;
  - Cumulative and Combined Effects; and

- Summary of Significant Environmental 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:** stand-alone figures volume containing all figures not included separately within the technical appendices.

Structure of Technical Chapters

7.1.9 The technical chapters in Volume I of the ES will be structured based on the following sub-headings:

Introduction

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

Legislation and Planning Policy Context

7.1.11 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.

Assessment Methodology and Significance Criteria

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

7.1.13 The significance of effects before and after mitigation 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.

7.1.14 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.

7.1.15 For issues where definitive quality standards or assessment guidance 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;
- sensitivity of these receptors; and
- duration of the impact.

7.1.16 The ES will clearly explain any assumptions that have been made in the assessments.

7.1.17 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:

- 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

7.1.18 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 DBA data searches, or a combination of these, as appropriate.

7.1.19 '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.

7.1.20 For the purposes of assessment, each chapter will identify a reasonable 'worst case scenario' with regards these future baseline scenarios.

Development Design and Impact Avoidance

7.1.21 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

7.1.22 This section will identify the likely impacts resulting from the Proposed Development. 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

7.1.23 The Mitigation and Enhancement Measures section will describe the measures that will be implemented by the Applicant to reduce any significant adverse environmental 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

7.1.24 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 and Combined Effects

7.1.25 In accordance with the EIA Regulations, consideration will be given to the potential for cumulative and combined/ in-combination effects to arise as a result of the Proposed Development.

Residual Effects and Conclusions

7.1.26 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.

Consultation

7.1.27 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 project design thereby limiting adverse effects and enhancing environmental benefits.

7.1.28 The following statutory consultees have been contacted prior to the submission of this EIA Scoping Report:

- Environment Agency; and
- Natural England.

7.1.29 Following the publication of this EIA Scoping Report, a non-statutory public consultation on the Proposed Development will be undertaken in Spring 2022. This will use a range of consultation methods, including public consultation events and a project website. The project website will be updated throughout the development of the Proposed Development to ensure stakeholders are provided with the latest information; this includes the details of events or activities to take place during the public consultation period. All responses received during the public consultation period will be carefully considered and taken into account in the design process for the Proposed Development. These responses will be summarised in a Statement of Community Involvement, which will be submitted alongside all planning application documents.

8.0 SUMMARY

8.1.1 This request for an EIA scoping opinion has identified the potential for significant environmental effects to arise from the construction and operation of the Proposed Development. The following specialist assessments for inclusion in the EIA are proposed:

- Surface Water, Flood Risk and Water Resources;
- Geology, Hydrogeology and Contaminated Land;
- Ecology and Nature Conservation;
- Landscape and Visual Amenity;
- Cultural Heritage;
- Traffic and Transportation;
- Air Quality;
- Noise and Vibration;
- Socio-Economics and Land-Use;
- Major Accidents and Disasters;
- Materials and Waste;
- Human Health; and
- Climate Change.

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 environmental effects are identified, mitigation measures will be described where possible to reduce the residual effects.

Other Matters Proposed for Scoping Out of the EIA

8.1.3 Where specific matters have been scoped out of the technical assessments included in Section 6, this has been outlined within those sections and has not been repeated here. Other matters scoped out of the EIA that are not included earlier in the Scoping Report are outlined below.

<u>Soils and Agriculture</u>

8.1.4 According to the Agricultural Land Classification map for the North East Region (ALC001), the majority of the Proposed Development Site is understood to be Non-Agricultural or Urban and therefore not Best and Most Versatile (BMV) agricultural land.

8.1.5 The Proposed Development Site intersects an area of Grade 2 (BMV) agricultural land within the Water Connection Corridor and Hydrogen Export Pipeline Corridor, immediately east of the existing Wilton International complex. This intersecting land comprises an existing industrial pipeline corridor with no ongoing agricultural use. The land would be used for construction of pipelines (potentially above-ground in-

line with existing pipelines, but 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).

8.1.6 It is therefore considered that significant effects on agricultural soils and on farm holdings are not likely, with any land use effects relating to agricultural land expected to be temporary. An assessment of impacts to agricultural soils BMV (best and most versatile) and to farm holdings is therefore scoped out of the EIA.

Electronic Interference

8.1.7 It is unlikely that the maximum building heights for any buildings proposed, and temporary construction cranes would be higher than other structures located in the vicinity of the Proposed Development (as an industrial area). In addition, there are no nearby residential properties likely to be affected. Therefore, a specific assessment of the Proposed Development's effect on electronic interference is not considered to be required.

8.1.8 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

8.1.9 It is proposed to scope out impacts on aviation based on the likely maximum height of the buildings and vents associated with the Proposed Development, which as shown in Figure 3-2 is expected to be approximately 40 m for the hydrogen vent. In general, it is considered that in the context of the surrounding industrial facilitates these are anticipated to be comparable to the heights of structures that have previously occupied the site at Redcar Steelworks.

8.1.10 The Civil Aviation Authority (CAA) will however be consulted on the Proposed Development to review any requirements for aviation lighting on the vents 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

A-1 **Site Location Plan**

A-2 **Parts of the Proposed Development Site Boundary**

A-3 **Ecological Constraints within 1km of the Proposed Development Site Boundary**

A-4 **Statutory Designated Ecological Sites within 10km of the Proposed Site Boundary**

A-5 **Water Receptors within 5km of the Proposed Development Site Boundary**

A-6 **Environmental Constraints within 1km of the Proposed Development Site Boundary**

A-7 **Major Accidents and Disasters Key Receptors**

A-8 **Other Developments to be Considered in the Cumulative Impact Assessment**

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LEGEND

- Proposed Development Site Boundary
- Main Site

NOTES

ISSUE PURPOSE

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PROJECT NUMBER

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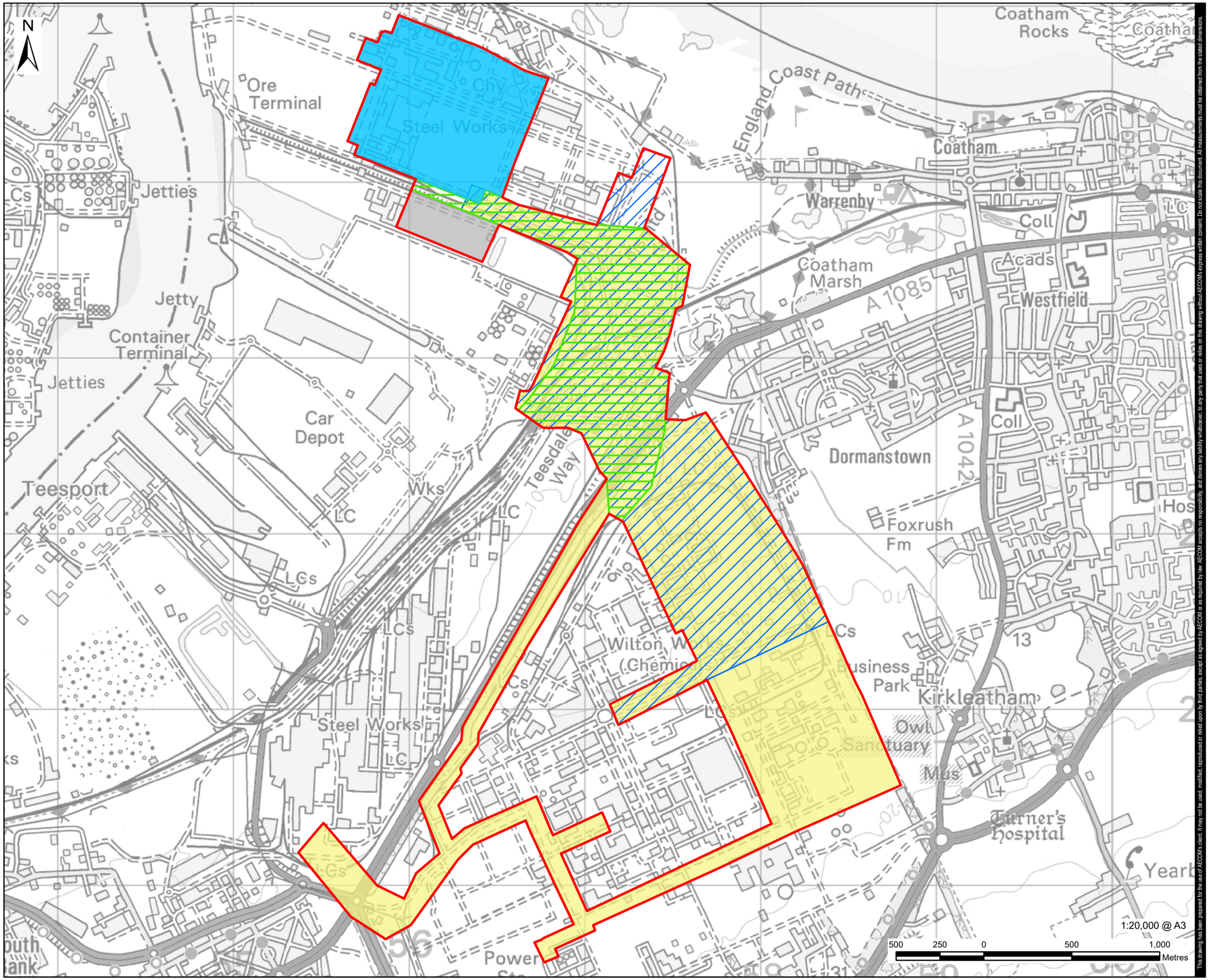
FIGURE TITLE

Site Location Plan

FIGURE NUMBER

Figure A-1



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LEGEND

- Proposed Development Site Boundary
- Electrical Connection Corridor
- Hydrogen Pipeline Corridor
- Indicative Temporary Construction Laydown Area
- Main Site
- Water Connection Corridor

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FIGURE TITLE

Parts of the Proposed Development Site Boundary

FIGURE NUMBER

Figure A-2

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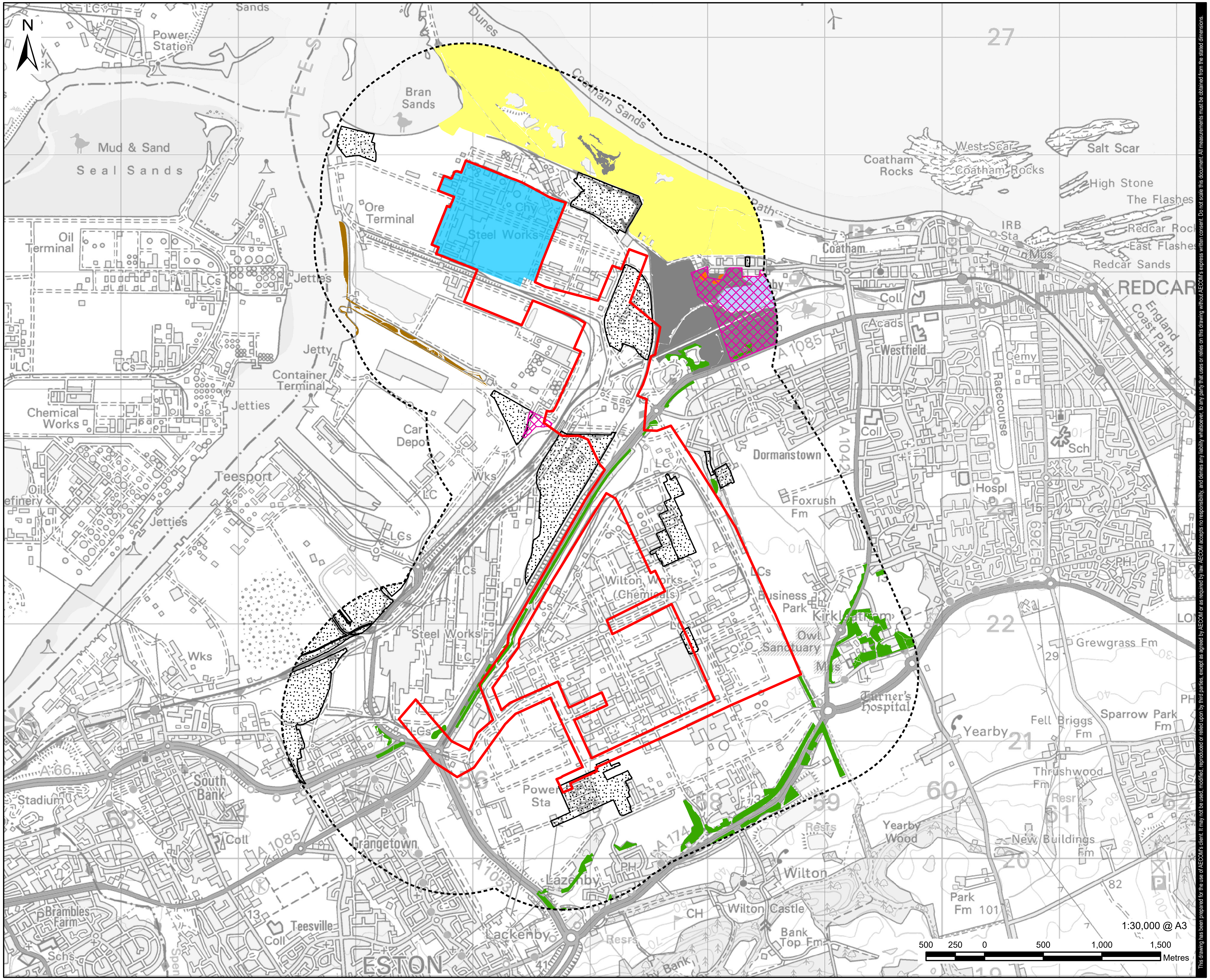

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LEGEND

- Proposed Development Site Boundary
- Proposed Development Site Boundary - 1km Buffer
- Main Site

Habitats of Principal Importance

- Coastal and floodplain grazing marsh
- Coastal sand dunes
- Deciduous woodland
- Mudflats
- No main habitat but additional habitats present
- Reedbeds
- Open Mosaic Habitat

Local Wildlife Sites (LWS)

- Redcar and Cleveland

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FIGURE TITLE

Ecological Constraints within 1km of the Proposed Development Site Boundary

FIGURE NUMBER

Figure A-3

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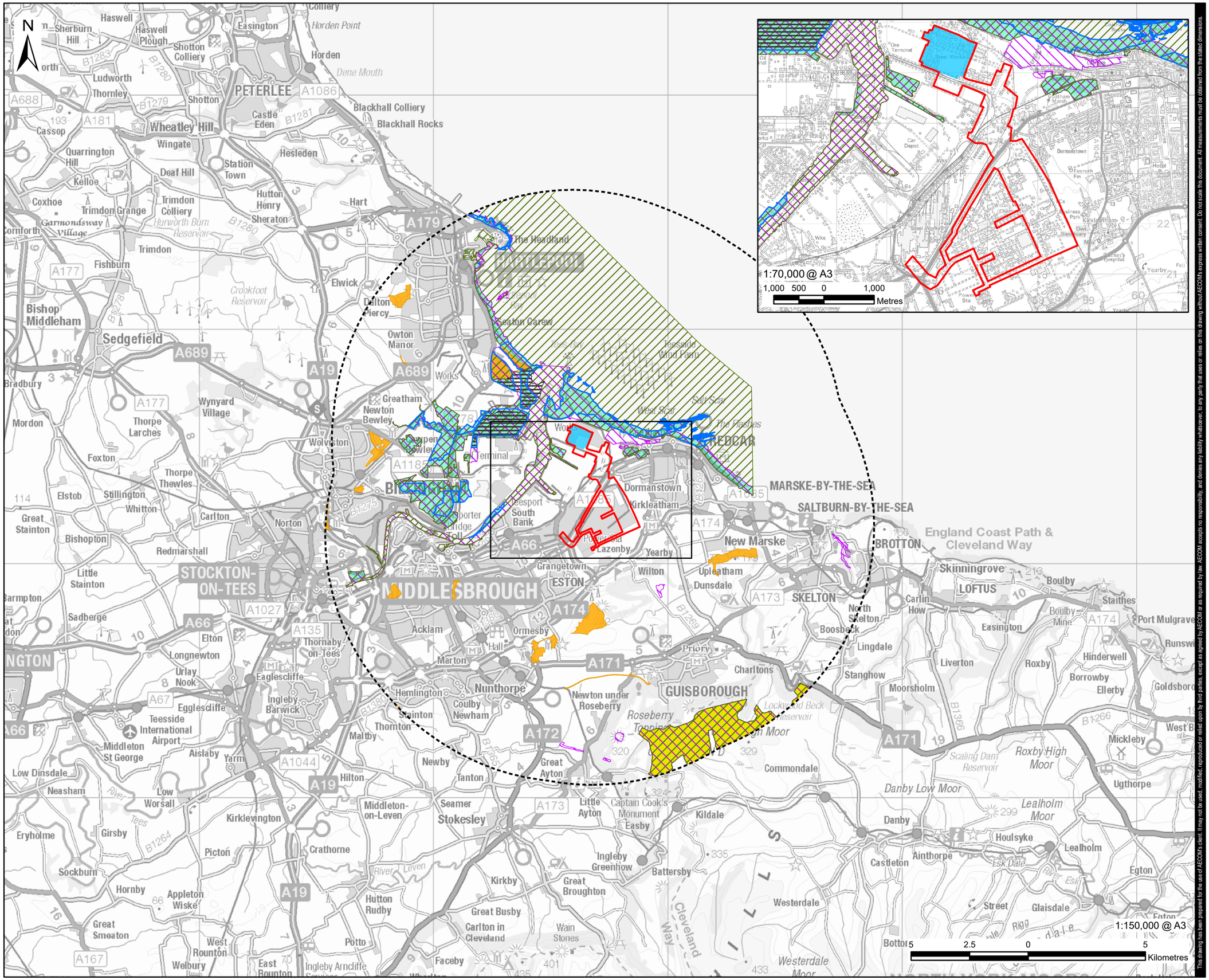

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LEGEND

- Proposed Development Site Boundary
- Proposed Development Site Boundary - 10km Buffer
- Main Site
- Local Nature Reserve (LNR)
- National Nature Reserve (NNR)
- Ramsar
- Proposed Ramsar
- Special Areas of Conservation (SAC)
- Special Protection Area (SPA)
- Sites of Special Scientific Interest (SSSI)

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FIGURE TITLE

Statutory Designated Ecological Sites within 10km of the Proposed Development Site Boundary

FIGURE NUMBER

Figure A-4

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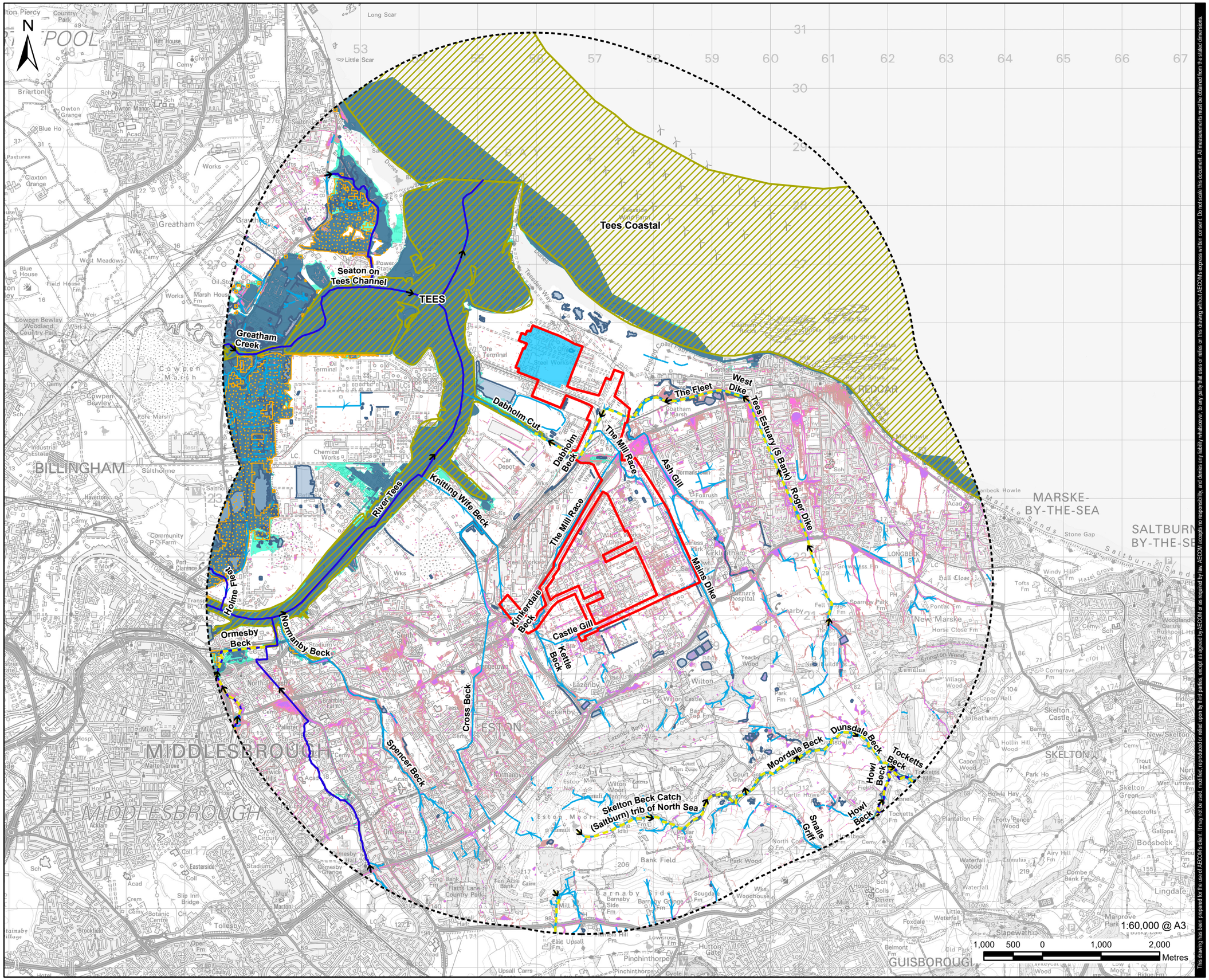

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LEGEND

- Proposed Development Site Boundary
- Proposed Development Site Boundary - 5km Buffer
- Main Site
- Main River
- Ordinary Watercourse
- Surface Water Area
- Flood Zone 3
- Flood Zone 2
- Reduction in Risk of Flooding from Rivers and Sea due to Defences

WFD Surface Water - Ecological Class

- Moderate (Heavily Modified)
- Moderate (Heavily Modified)

Risk of Flooding from Surface Water

- 3.3% Annual Chance
- 1% percent annual chance
- 0.01% Annual Chance

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PROJECT NUMBER

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FIGURE TITLE

Water Receptors within 5km of the Proposed Development Site Boundary

FIGURE NUMBER

Figure A-5

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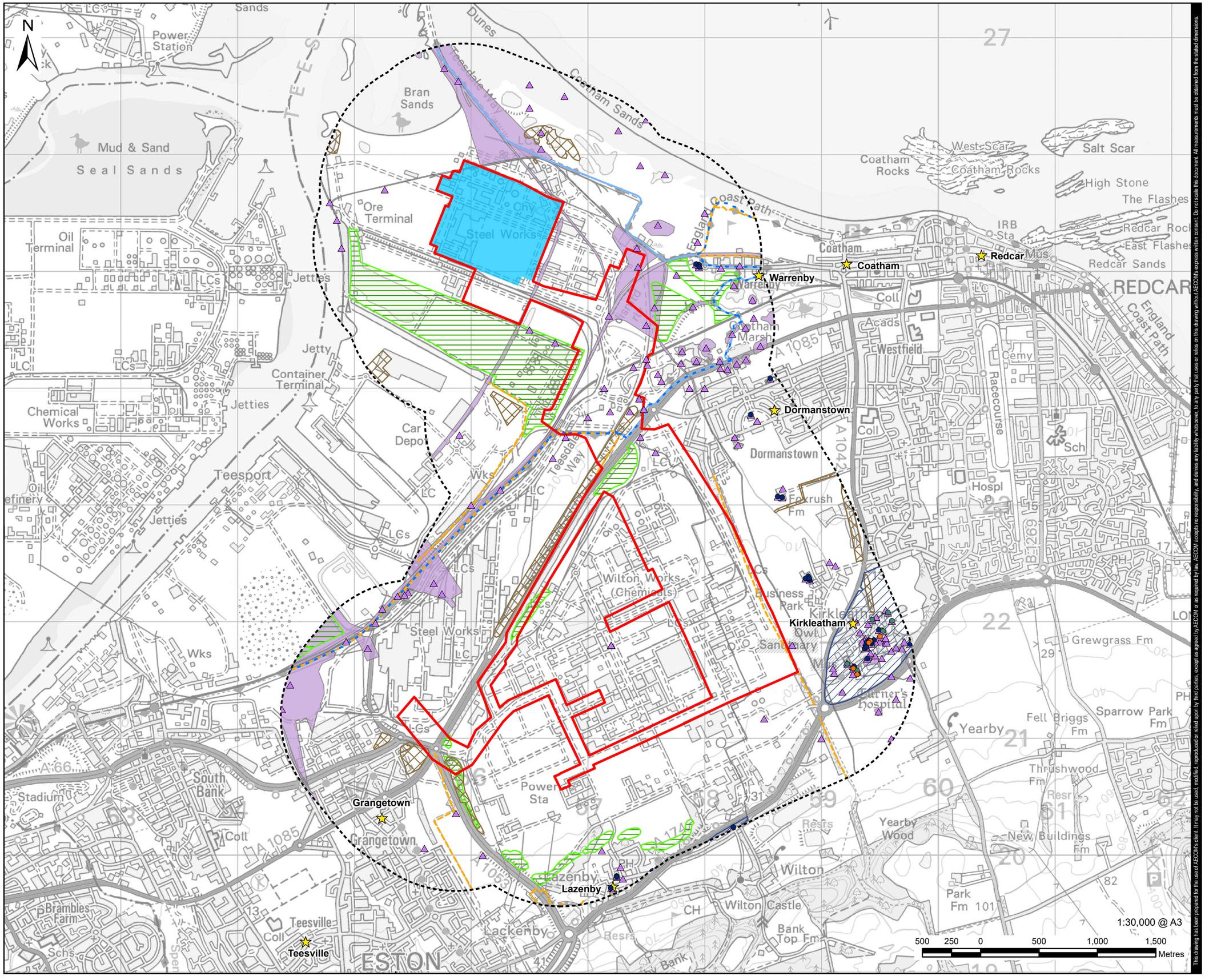

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LEGEND

- Proposed Development Site Boundary
- Proposed Development Site Boundary - 1km Buffer
- Main Site
- Authorised Landfill
- Historic Landfill
- Residential Areas
- Public Rights of Way
- England Coast Path
- Long Distance Route

Cultural Heritage

Listed Buildings

- Grade I
- Grade II*
- Grade II

Historic Environment Record (HER)

- Redcar and Cleveland (Point)
- Hartlepool (Area)
- Redcar and Cleveland (Area)
- Redcar and Cleveland Conservation Areas

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FIGURE TITLE

Environmental Constraints within 1km of the Proposed Development Site Boundary

FIGURE NUMBER

Figure A-6

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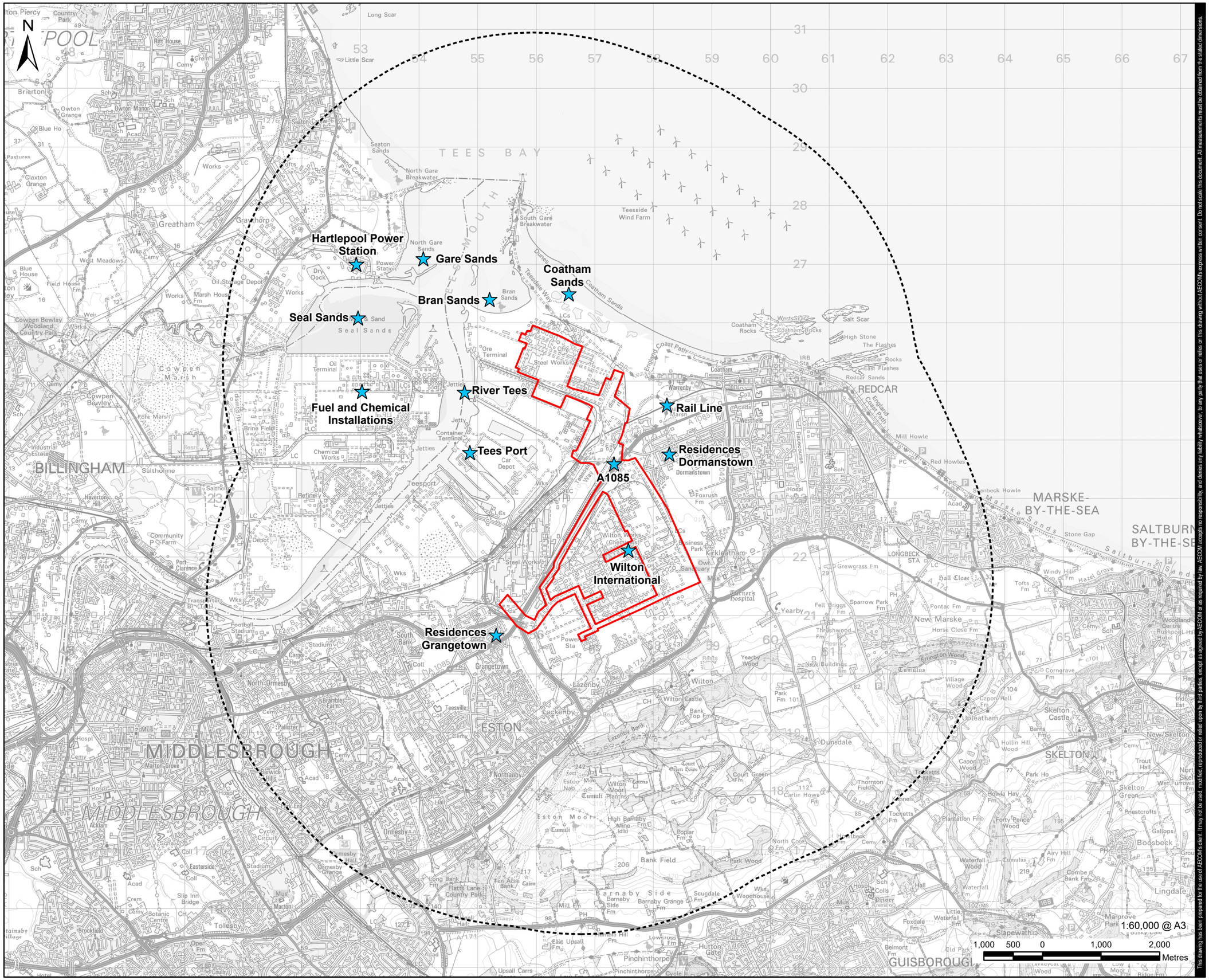

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LEGEND

- Proposed Development Site Boundary
- Proposed Development Site Boundary - 5km Buffer
- Receptors

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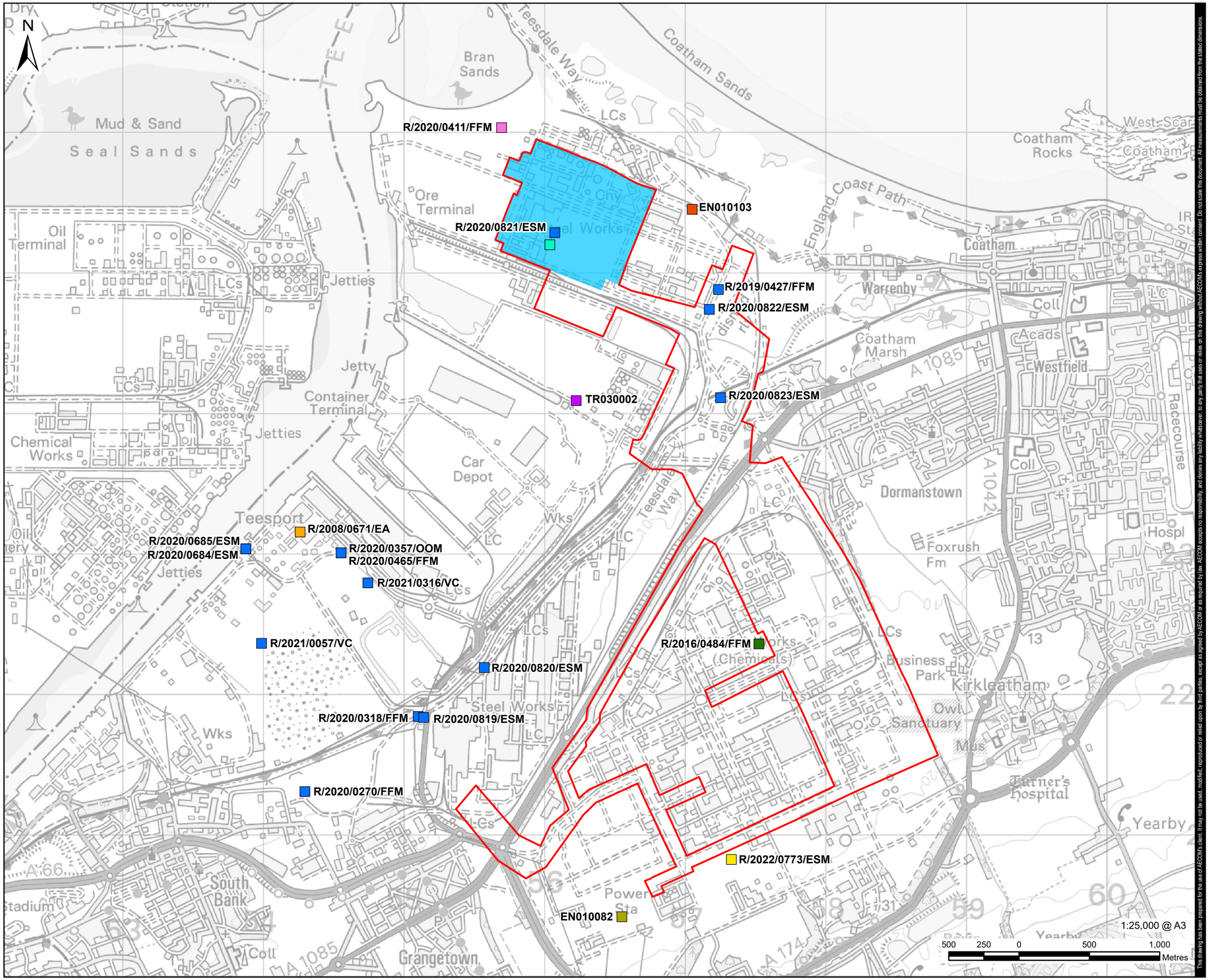
FIGURE TITLE

Major Accidents and Disasters Key Receptors (indicative)

FIGURE NUMBER

Figure A-7



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AECOM

PROJECT

HyGreen

APPLICANT

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LEGEND

- Proposed Development Site Boundary
- Main Site
- CBRE Anaerobic Biogas Production Facility
- H2Teesside
- MGT Teesside Tees Renewable Energy Plant (REP)
- Net Zero Teesside
- Redcar Energy Centre (REC)
- South Tees Development Corporation (STDC) Projects
- Tees Combined Cycle Power Plant (CCPP)
- Tees Valley Lithium Project
- York Potash Harbour Facilities

NOTES

ISSUE PURPOSE

EIA Scoping

PROJECT NUMBER

60701717

FIGURE TITLE

Other Developments to be Considered in the Cumulative Impact Assessment (indicative)

FIGURE NUMBER

Figure A-8

APPENDIX B: LONG LIST OF MA&D CATEGORIES AND SCOPING STATUS

HAZARD	SCOPED IN (Y/N)	COMMENTARY
Construction Hazards		
Accidental Impact/ Structural Collapse/ Utility Strike/ Unexploded Ordnance (UXO)	Y	Construction hazards can include events which have the potential for harm, including fatal injuries to workers. The impacts onsite 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. Potential for a major construction incident such as fire or explosion to have an impact at neighbouring industrial facilities. Potential for a major incident to have an impact offsite. 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 to the environment both onsite and offsite. This category is scoped in for further assessment.
Operational Process Hazards		
Fire	Y	The accidental release of flammable substances such as hydrogen could result in a fire if immediately ignited. This could result in harm to people onsite and potentially offsite. Potassium hydroxide (KOH) is classified as highly corrosive and could generate flammable hydrogen gas if exposed to aluminium and other materials. In the event of a fire, harmful potassium oxide gases could be generated. There is also the potential for fires of electrical origin in systems such as the transformer buildings. While staff are unlikely to be in the immediate vicinity of a fire as it originates in the transformer buildings, it 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. Additionally, the accidental mixing of hydrogen and oxygen within the electrolyser may lead to an internal explosion or deflagration. These scenarios could result in significant harm to people onsite and potentially offsite. This category is scoped in for further assessment.

HAZARD	SCOPED IN (Y/N)	COMMENTARY
Oxidising gas release	Y	Oxygen is classified as an oxidising gas, therefore in the event of a fire it may intensify or prolong the incident. The contribution of oxygen to a fire scenario will therefore be scoped in for further assessment.
Asphyxiant gas release	Y	Nitrogen is classified as an asphyxiant gas and will be used on site for safety purposes, such as purging pipework and other process equipment to remove hydrogen and oxygen. Following use, nitrogen gas will be vented at a safe location where site workers will not be present. Where operations are carried out within buildings such as the Electrolyser, there is the potential for an accidental release to present a risk of asphyxiation in the event of persons being present. Consequently, this category is scoped in for further assessment.
Environmentally harmful liquid release	Y	A release of aqueous potassium hydroxide (KOH) or diesel which reaches 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. In the event of a major fire, firewater may be applied and in the event of a failure of containment systems, the corresponding run off potentially containing harmful materials could reach environmental receptors. A release of firewater is therefore scoped in for further assessment.
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. There is also the potential for a loss of containment of hydrogen at the offtake points to initiate domino events. Conversely, a major incident could have an impact on neighbouring facilities and offtakes. Domino effects are therefore scoped in for further assessment.
Operational Transportation Hazards		
Road traffic accident (dangerous goods)	Y	Hydrogen may be transported by road, therefore collisions/ accidents involving road tankers containing hydrogen is a credible scenario and is scoped in for further assessment.
Other Industrial Hazards		

HAZARD	SCOPED IN (Y/N)	COMMENTARY
Electrical failure	Y	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 have installed back-up power generation and uninterruptable power supplies (UPS). In an emergency event such as the loss of power supplies or an operational upset, equipment will be provided for the safe disposal of gas. Maintenance activities (planned and unplanned) on electrical systems include the potential for hazards such as fire and arc flash during activities such as testing circuit breakers. These risks are mitigated via training, procedures and equipment, but the consequences of an incident include harm to people onsite up to potential fatalities. Electrical system failure is therefore scoped in for further assessment.
Electrocution	Y	During operation, electrical equipment may present a hazard by its presence to personnel working on, near, or with the equipment. This risk will be managed by design of the equipment and its use/management in accordance with standard practices and procedures. However, the consequences of personnel being electrocuted, even at low voltages include harm (or potential fatality). Therefore, the potential for electrocution is therefore scoped in for further assessment.
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.

HAZARD	SCOPED IN (Y/N)	COMMENTARY
High temperatures / heatwave	N	In the event of a prolonged period of hot weather there is the potential for an impact to temperature 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 in the Proposed Development for the provision of lighting 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 Main Site and within the 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 Proposed Development 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 ES chapter. This is considered a credible MA&D scenario, therefore scoped in for further assessment.
Fluvial Flood	Y	The Proposed Development 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 Flood Risk Assessment (FRA) and summarised within the Surface Water, Flood Risk and Water Resources ES 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 Proposed Development Site have 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 ES 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 ES 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 however the Proposed Development is not expected to be particularly vulnerable this hazard. The Proposed 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 scoped out of 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 scoped out of 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, therefore security controls will be included within the design and operation of the Proposed Development. These controls will reduce the potential for this hazard therefore this category has been scoped out of further assessment.