H2Teesside Project

Environmental Statement

Planning Inspectorate Reference: EN070009 APP/6.1

Land within the boroughs of Redcar and Cleveland and Stockton-on-Tees, Teesside and within the borough of Hartlepool, County Durham

Non-Technical Summary

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

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

Applicant: H2 Teesside Ltd

Date: August 2024

Rev: 1

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1.0 NON-TECHNICAL SUMMARY

1.1 Introduction

1.1.1 This document presents a Non-Technical Summary (NTS) (EN070009/APP/6.1) of the Environmental Statement (ES) that has been prepared to accompany the Development Consent Order (DCO) application for the construction, operation and maintenance of the H2Teesside project – a nationally significant infrastructure project comprising a new Hydrogen Production Facility and Hydrogen Distribution Network within Teesside.

1.1.2 The Proposed Development is an up to 1.2-Gigawatt Thermal (GWth) Carbon Capture and Storage (CCS) enabled Hydrogen Production Facility. The Proposed Development includes associated connections, including a pipeline network to distribute hydrogen to local offtakers and temporary construction compound areas, on land in Redcar and Cleveland, Stockton-on-Tees, and Hartlepool (hereafter referred to as the Proposed Development Site).

1.1.3 The Proposed Development Site ('the Site') covers an area located within the administrative boundaries of Redcar and Cleveland Borough Council (RCBC) to the south of the River Tees (South Bank and Dormanstown Wards) and Stockton-on-Tees Borough Council (STBC) (Billingham South and Billingham East Wards) and Hartlepool Borough Council (HBC) (Seaton Ward) to the north of the River Tees. A large portion of the Site to the south of the Tees lies within the South Tees Development Corporation (STDC) masterplan site and the Wilton International Site.

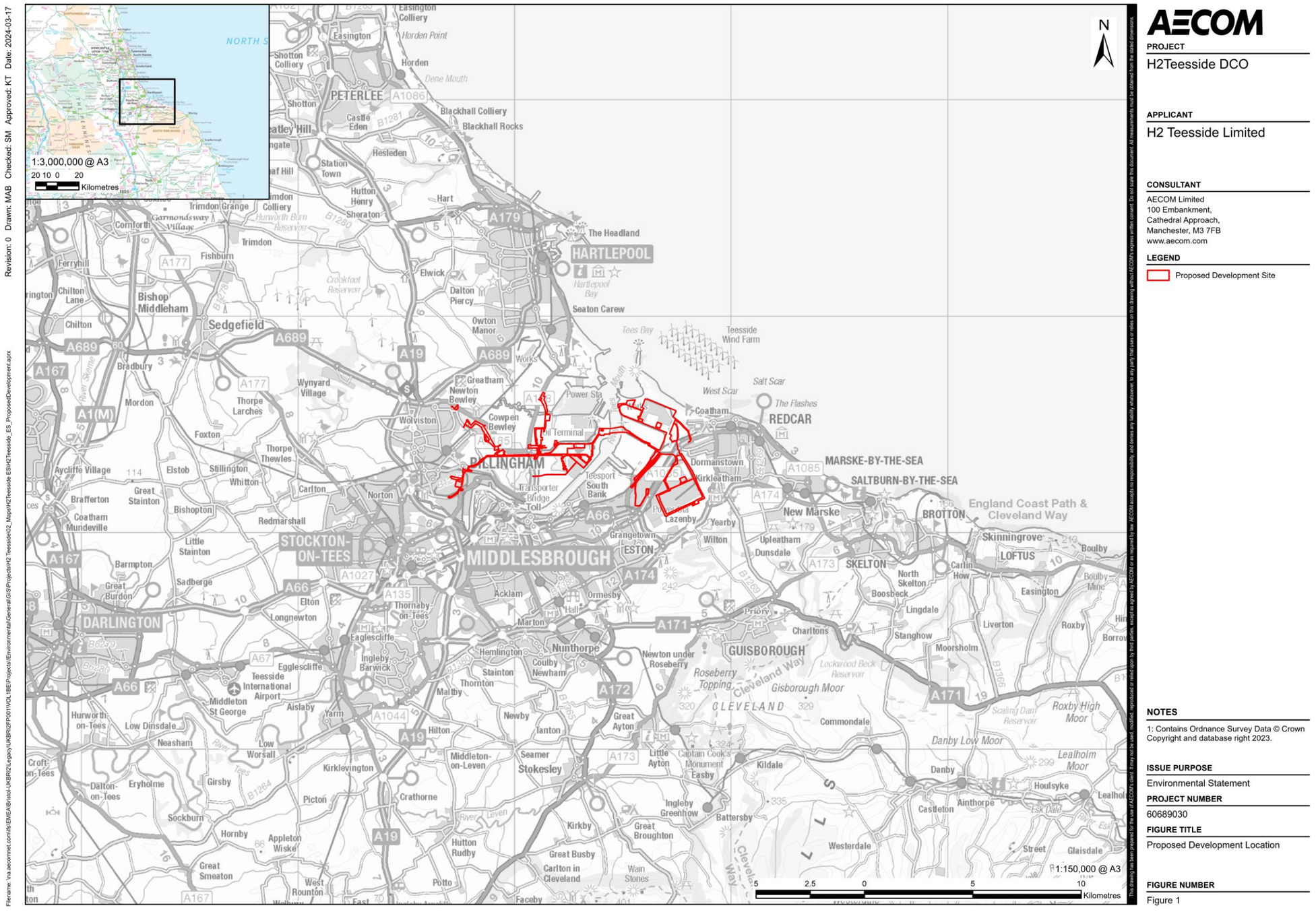
1.1.4 The Site boundary for the purposes of the DCO application, including land for the hydrogen pipeline corridors and temporary land required during construction of the Proposed Development, has been refined through on-going studies and taking into account responses received through statutory and non-statutory consultation.

1.1.5 Carbon dioxide captured during the hydrogen production process will be compressed and piped to the adjacent separately consented Net Zero Teesside/Northern Endurance Partnership facility for high pressure compression and export for permanent storage in the Endurance Store beneath the North Sea.

1.1.6 The Proposed Development to which this DCO application and the accompanying ES relates includes development below Mean High Water Springs in the form of underground crossings by the hydrogen pipeline network of the River Tees and Greatham Creek. These crossings do not require consenting via a Marine Licence as both are below the bed of these watercourses and will not affect the marine environment.

1.1.7 Whilst the Proposed Development is designed for production and distribution of low-carbon hydrogen, the potential local connections to the proposed hydrogen pipeline at the sites of future offtakers do not form part of the DCO application and are not considered in this ES. Third party connections will be the subject of separate consent applications.

1.1.8 The Site Location is shown on **Figure 1** Proposed Development Location, below.



AECOM

PROJECT
H2Teesside DCO

APPLICANT
H2 Teesside Limited

CONSULTANT
AECOM Limited
100 Embankment,
Cathedral Approach,
Manchester, M3 7FB
www.aecom.com

LEGEND
Proposed Development Site

NOTES
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ISSUE PURPOSE
Environmental Statement

PROJECT NUMBER
60689030

FIGURE TITLE
Proposed Development Location

FIGURE NUMBER
Figure 1

Figure 1: Proposed Development Location

1.1.9 The ES has been prepared to comply with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) ('the EIA Regulations'). Environmental Impact Assessment (EIA) is a systematic process used to predict the adverse and beneficial effects of a Proposed Development. An ES has been prepared and submitted with the DCO application for the Proposed Development. (ES Volume I, EN070009/APP/6.2) (ES Volume II, EN070009/APP/6.3) (ES Volume III, EN070009/APP/6.4).

1.1.10 The ES presents:

- a description of the Proposed Development including information on the Site and the development design, size and other relevant features;
- baseline data gathered to inform the impact assessment process;
- information on the reasonable alternative sites, technologies and layouts that have been considered and the main reasons for the options chosen;
- an assessment of the likely significant environmental effects of the construction, operation (including maintenance) and decommissioning of the Proposed Development; and
- measures that are proposed to avoid, prevent or reduce, or if possible, offset, such likely significant adverse effects.

1.1.11 This NTS is a standalone document, the purpose of which is to describe the Proposed Development and provide a summary in non-technical language of the key findings of the EIA reported in the ES.

1.1.12 Section 2 of this NTS summarises the assessment methodology and further. Technical details of the EIA process are provided within Chapter 2: Assessment Methodology (ES Volume I, EN070009/APP/6.2).

1.1.13 Further information on the Proposed Development can be found in Chapter 4: Proposed Development (ES Volume I, EN070009/APP/6.2) and on the project website:
https://www.bp.com/en_gb/united-kingdom/home/where-we-operate/reimagining-teesside/h2teesside.html

1.2 The Applicant

1.2.1 The Applicant is H2 Teesside Limited, a bp company. H2 Teesside Limited will be the lead developer of the Proposed Development and bp will be appointed as the operator of the Proposed Development. The Applicant is bringing forward proposals to construct, operate and maintain the H2Teesside project – a nationally significant infrastructure project comprising a new Hydrogen Production Facility and Hydrogen Distribution Network within Teesside.

1.2.2 The Proposed Development will support the decarbonisation of industrial processes using natural gas. This will help the UK to achieve national Net Zero targets, as well as helping to maintain and restore manufacturing jobs in Teesside.

1.3 The Development Consent Order

1.3.1 A DCO is required for the Proposed Development as the Secretary of State made a 'Section 35 direction' as they considered that it is a project of national significance. The Applicant has therefore submitted an application to the Secretary of State (for Energy Security and Net Zero) under Section 37 of the Planning Act 2008 (the Planning Act), seeking a DCO for the Proposed Development.

1.3.2 Subject to it being granted by the SoS, the DCO provides the necessary authorisation for the construction, operation, maintenance and decommissioning of the Proposed Development.

2.0 ASSESSMENT METHODOLOGY

2.1 EIA Methodology

2.1.1 The assessment presented in the ES follows a standard EIA methodology, which is summarised below.

2.1.2 The objective of the EIA process is to anticipate the changes (or 'impacts') that may occur to the environment as a result of the Proposed Development, such as increases in traffic and changes to air quality or noise. The changes are compared to the environmental conditions that would have occurred without the Proposed Development (defined as 'the baseline'). The EIA process identifies potentially sensitive 'receptors' that may be affected by these changes (e.g. people living near the Proposed Development, local flora and fauna) and defines the extent to which these receptors may be affected by the predicted changes (i.e. whether or not the receptors are likely to experience a 'significant effect').

2.1.3 Where possible, the EIA uses standard methodologies, based on legislation, defined standards and accepted industry criteria. This is set out in detail in each technical chapter (ES Volume I, EN070009/APP/6.2).

2.1.4 Effects on the receptors can be adverse (negative), neutral (neither negative nor positive) or beneficial (positive). They can also be temporary (e.g. noise during construction) or permanent (e.g. the views of the finished buildings).

2.1.5 For the purpose of the ES, adverse and beneficial effects are described as 'significant' or 'not significant'. Where the EIA predicts a significant adverse effect on one or more receptors, mitigation measures are identified where possible to avoid or minimise the effect, or to reduce the likelihood of the effect happening. The use of such mitigation will be secured through Requirements included within the DCO or through other legislation and consenting regimes. Details of the EIA Assessment Methodology are provided within Chapter 2: Assessment Methodology (ES Volume I, EN070009/APP/6.2).

2.2 EIA Scoping (Selection of Environmental Topics to be assessed)

2.2.1 EIA Scoping is a process that is designed to identify relevant topics that should be included in the EIA and reported in the Environmental Statement (ES). An EIA Scoping Report and a request for an EIA Scoping Opinion under Regulation 10 of the EIA Regulations was submitted to the Planning Inspectorate (PINS) on 11th April 2023 to allow them and relevant consultees to comment on the extent and approach to the environmental assessments to be undertaken.

2.2.2 A Scoping Opinion was received from PINS on 17th May 2023 and is presented within Appendix 1B in ES Volume III (EN070009/APP/6.4). The ES is based on the Scoping Opinion and includes assessments of the following environmental topics: (with the main assessment chapters for these found in Chapters 8 to 22 of ES Volume I (EN070009/APP/6.2)):

- air quality;

- surface water, flood risk and water resources;
- geology, hydrogeology and contaminated land;
- noise and vibration;
- ecology and nature conservation (including aquatic ecology);
- ornithology;
- marine ecology;
- ornithology;
- traffic and transport;
- landscape and visual amenity;
- cultural heritage;
- socio-economics and land-use;
- climate change;
- major accidents and disasters;
- materials and waste;
- human health; and
- cumulative and combined effects.

2.2.3 Following the completion of an EIA Scoping Report and publication of PINS' Scoping Opinion, the environmental information for a DCO is reported in two stages:

- a Preliminary Environmental Information (PEI) Report, which is prepared to inform consultation with the public and other stakeholders about the Proposed Development, based on the preliminary environmental information available at the time of consultation; and
- an ES, which is then prepared to accompany the DCO application and reports the findings of the EIA of the Proposed Development, taking account of any design evolution that has taken place as well as feedback received during consultation.

2.2.4 The PEI Report for the H2Teesside Project was prepared to meet the requirements of Regulation 12(2) of the EIA Regulations and was published on 14th September 2023. In order to enable consultees to understand the likely environmental effects of the Proposed Development, the PEI Report presented preliminary findings of the environmental assessments undertaken up to that point in time. This allowed consultees the opportunity to provide informed comments on the Proposed Development, the assessment process and preliminary findings prior to the finalisation of the ES.

2.2.5 Regulation 14(2) describes the requirements of an ES, which includes a description of the Proposed Development, the likely significant effects of the Proposed Development on the environment, measures to avoid, prevent, reduce and offset

likely significant adverse effects, a description of alternatives and reasons for the options chosen, and a non-technical summary of the information. This document is the non-technical summary of the ES submitted with the DCO application.

2.3 Consultation

2.3.1 Consultation is integral to the preparation of DCO applications and to the EIA process. The Planning Act requires applicants for development consent to carry out pre-application consultation on their proposals. This includes consultation on the PEI Report, as described above.

2.3.2 Consultation with key stakeholders has been ongoing throughout the EIA process and on publication of the PEI Report, and comments have been taken into account and addressed in the ES where applicable.

2.3.3 The Applicant has consulted with a range of statutory bodies, interest groups, landowners, businesses and communities (referred to as stakeholders) at key points in the Proposed Development and environmental assessment of the Proposed Development.

2.3.4 Prior to submitting application for development consent, three rounds of consultation were undertaken to seek the views of stakeholders on the Proposed Development:

- First Statutory Consultation – held between 14 September 2023 and 26 October 2023;
- Second Statutory Consultation – held between 13 December 2023 and 23 January 2024; and
- Additional/Targeted Consultation - held between 9 February 2024 and 10 March 2024.

2.3.5 All the consultation responses received have been considered in the preparation of the application and supporting documentation, as set out in the Consultation Report (EN070009/APP/5.1) that also accompanies the DCO application. Stakeholder feedback gathered from consultations has been used to:

- inform and refine the design of the Proposed Development, and how they will be built;
- obtain further information about the existing environment;
- focus the environmental assessments on relevant issues; and
- identify environmental mitigation, control and protection measures to be implemented across the different phases of the Proposed Development.

2.4 Environmental Statement Report Structure

2.4.1 The format of the ES is as follows:

2.4.2 Volume I of the ES (EN070009/APP/6.2) is structured into chapters, as follows:

- Chapters 1 and 2 – an introduction to the ES and EIA assessment methodology approach;
- Chapters 3 to 6 – a description of the Proposed Development including information on the surrounding area and on construction timescales and alternatives;
- Chapter 7 – a summary of relevant legislation and policy;
- Chapters 8 to 22 –assessments of the likely significant effects of the Proposed Development in relation to the environmental topics considered in the EIA;
- Chapter 23 – an assessment of the potential for cumulative and combined effects to occur as a result of the Proposed Development; and
- Chapter 24 – a summary of the likely significant environmental effects identified.

2.4.3 Volumes II (EN070009/APP/6.3) and III (EN070009/APP/6.4) of the ES contain the figures and technical appendices respectively that accompany each chapter of Volume I. Volume IV is this NTS (EN070009/APP/6.1).

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

3.1 The Site

3.1.1 All of the land included within the DCO boundary is referred to as 'the Site' for the purposes of the ES and this NTS. The Site has an area of 507 ha and contains all of the land required for the Proposed Development.

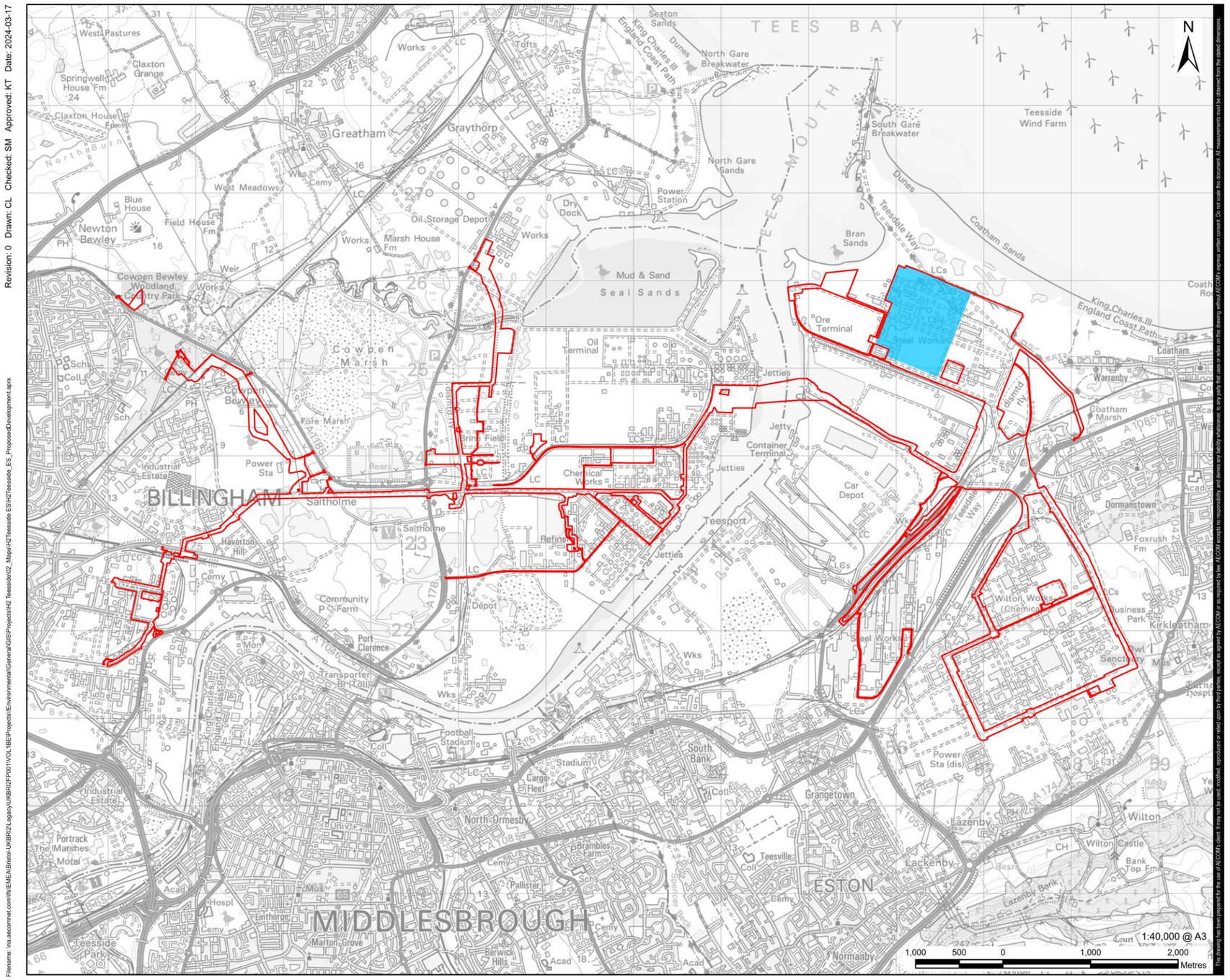
3.1.2 Within the Site is the area referred to as the Main Site within which the main built development will take place, and which will be the location of the hydrogen production facility with the associated carbon capture and compression facilities.

3.1.3 The Site is divided into the following areas (described in more detail in Chapter 3: Description of the Existing Environment (ES Volume I, EN070009/APP/6.2). Further detail on the different areas which make up the Proposed Development is provided in Section 4 of this NTS and Chapter 4: Proposed Development (ES Volume I, EN070009/APP/6.2).

- The Site boundary and the location of the Main Site (refer to **Figure 2** below);
- Hydrogen Pipeline Corridor (refer to **Figure 3** below);
- Carbon Dioxide Export Corridor (refer to **Figure 3** below);
- Natural Gas Connection Corridor (refer to **Figure 3** below);
- Electrical Connection (refer to **Figure 3** below); and
- Water Connections (including wastewater treatment and disposal infrastructure) (refer to **Figure 3** below).

3.1.4 The Main Site has an area of approximately 86 ha and will be located on the existing STDC site. This is land which was formerly part of the former Redcar Steelworks site and is located in the South Bank Ward of RCBC on the south bank of the River Tees, to the south-east of the Redcar Bulk Terminal and to the west of the consented Net Zero Teesside Power, Capture and Compression Site and its Carbon Dioxide Export pipeline to the off-shore Endurance Store.

3.1.5 The Main Site is remote from residential receptors, although there are areas of public/private amenity close to its northern and eastern boundary. The nearest residential settlements to the Main Site are the town of Redcar (approximately 2 km south-east) including the suburb of Dormanstown (approximately 2.3 km to the south-east) and the village of Warrenby (approximately 1.3 km to the east), which consists of the Warrenby Industrial Estate and a single residential property (Marsh House Farm). Other settlements located near the Hydrogen Pipeline Corridor are Cowpen Bewley (approximately 0.1 km to the south-east), Kirkleatham (approximately 0.6 km to the east), Billingham (approximately 1.4 km to the west), Grangetown (approximately 1.0 km to the south), and Greatham (approximately 2.3 km to the north-west).



AECOM

PROJECT
H2Teesside DCO

APPLICANT
H2 Teesside Limited

CONSULTANT
AECOM Limited
100 Embankment,
Cathedral Approach,
Manchester, M3 7FB
www.aecom.com

LEGEND
- Proposed Development Site
- Carbon Capture Enabled Hydrogen Production Facility

NOTES
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ISSUE PURPOSE
Environmental Statement

PROJECT NUMBER
60689030

FIGURE TITLE
Proposed Development Site (including location of the Main Site)

FIGURE NUMBER
Figure 2

Revision: 0 Drawn: CL Checked: SM Approved: KT Date: 2024-03-17

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Figure 2: Proposed Development Site (including location of the Main Site)

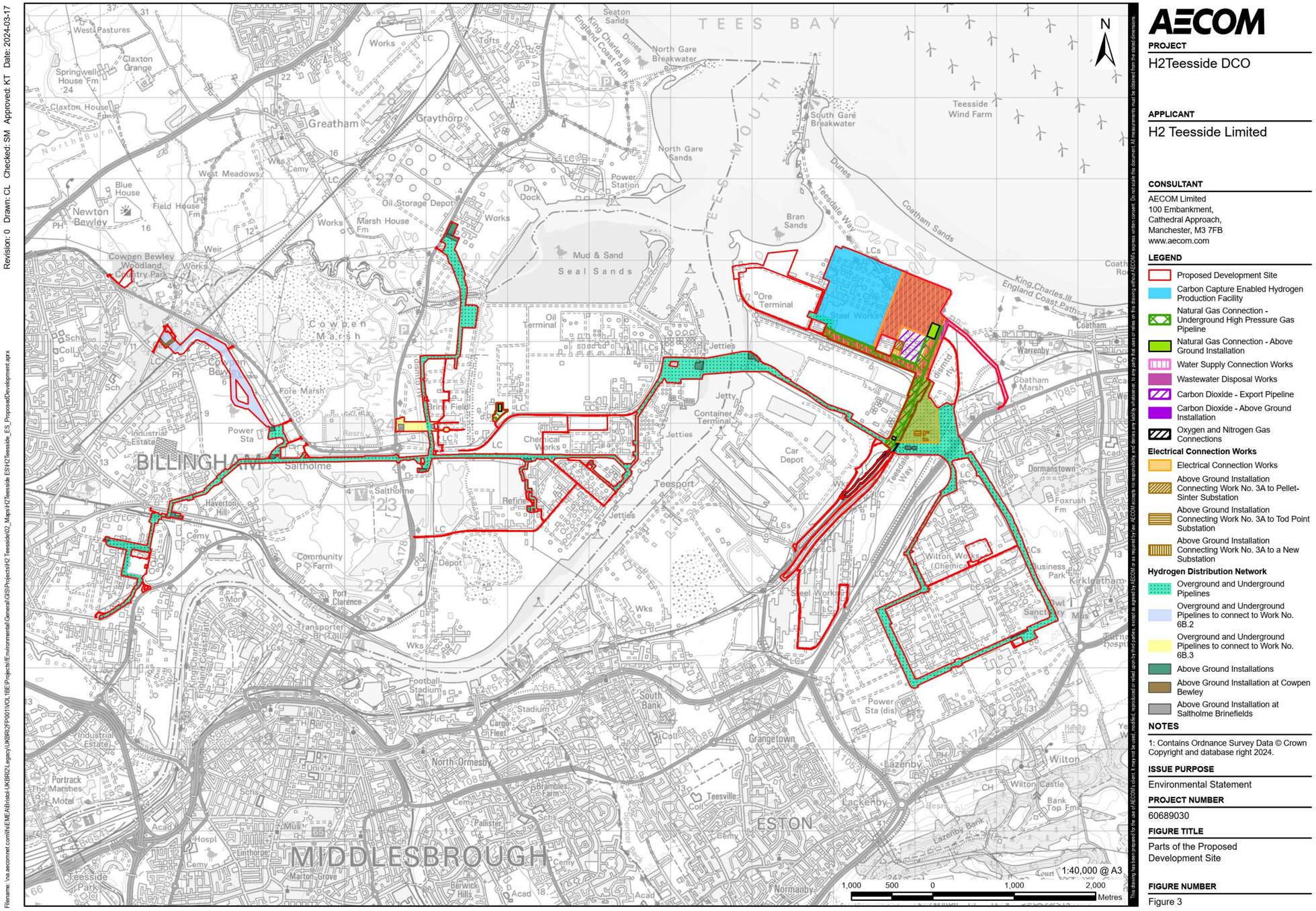

Figure 3: Parts of the Proposed Development Site

3.1.6 The other Connections Corridors outside the Main Site are located within and around land developed for use by the steel industry from the late 19th century and by the chemical industry after the Second World War, including land at Billingham and Seal Sands. The majority of this land has been reclaimed from the Tees Estuary in the past. The hydrogen pipeline also passes through vacant land or existing utilities corridors to the south and north of the River Tees, and also through land in agricultural use at Greatham and Saltholme and near Cowpen Bewley village and has a terminus within Cowpen Bewley Woodland Park.

3.2 The Surrounding Area

3.2.1 The area surrounding the Site is described in more detail in Chapter 3: Description of the Existing Environment (ES Volume I, EN070009/APP/6.2). The area surrounding the Site is predominantly characterised by industrial and agricultural land uses with areas of floodplain and grazing marsh with woodland at Cowpen Bewley Woodland Park.

3.2.2 To the north of the Main Site lie the coastal areas of South Gare and Coatham Dunes and Sands. To the south lies Northumbrian Water's Bran Sands wastewater treatment plant and operational land of PD Ports Teesport. To the south-east is the Wilton International chemical complex.

3.2.3 The Site extends north and west across the River Tees through Seal Sands industrial complex and on towards Billingham with branches toward Greatham and Cowpen Bewley.

3.2.4 Access routes to the Main Site will be via existing access roads from the A1085 Trunk Road between Redcar and the A1053 Tees Dock Road, north of Grangetown and approximately 4 km south of the Main Site. From here, the A19 will be accessed from either the A66, passing north of Middlesbrough, or the A174, passing to the south. Traffic accessing parts of the Site located to the north of the River Tees will travel from the A19 via the A1046, A178 and A1185.

3.3 Potential Sensitive Receptors

3.3.1 A number of environmental receptors have been identified within and outside the boundary of the Site. and are described in more detail in Chapter 3: Description of the Existing Environment (ES Volume I, EN070009/APP/6.2). Distances are provided as the shortest distance between the receptor and the closest point of the boundary of the overall Proposed Development site and/or the Main Site.

3.3.2 Key receptors for each topic area have been identified as part of the assessment process and details are included in the relevant technical chapters. (Chapters 8 to 24, ES Volume I, EN070009/APP/6.2). A summary is provided below. **Figure 4** (below) presents the environmental constraints within a 1 km radius around the Proposed Development Site and within the surrounding area, these are also detailed in the following paragraphs below.

Residential and Amenity Receptors

3.3.3 There are no residential receptors within the Site boundary. The closest residential properties (individual receptors) to the Main Site are those at Marsh House Farm in Warrenby, 1.3 km to the east and on Broadway West in Dormanstown, approximately 2.3 km to the south-east. The closest residential receptor in Cowpen Bewley to the hydrogen pipeline is located approximately 100 m to the south of the pipeline.

3.3.4 The Hydrogen Pipeline Corridor extends into the Cowpen Bewley Woodland Park and designated open space, and the provision of replacement open space ('Replacement Land') is included as part of the Proposed Development. The Replacement Land will be used to mitigate the loss of designated open space in the Cowpen Bewley Woodland Park as a result of the construction of the Hydrogen Pipeline.

Sensitive Environmental Receptors

3.3.5 There are no statutory designated ecological sites within the Main Site or the majority of the connection corridors. Three statutory designated ecological sites are located immediately north of the Main Site, at the proposed trenchless crossing of Greatham Creek, and to the north and south of the hydrogen pipeline corridor at Dabholm Gut and in Saltholme. These are:

- Teesmouth and Cleveland Coast Special Protection Area (SPA);
- Teesmouth and Cleveland Coast Ramsar site; and
- Teesmouth and Cleveland Coast Site of Special Scientific Interest (SSSI).

3.3.6 The SPA/Ramsar sites include a range of coastal habitats (sand and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes) on and around the Tees Estuary and are designated for internationally important numbers of marine and shore birds including breeding and wintering waterfowl. The SSSI is nationally important for sand dune and salt marsh habitats, breeding harbour seals and a range of bird species.

Public Rights of Way and Highways

3.3.7 There are no adopted highways within the Main Site. The Proposed Development Site extends across a number of transport routes (highways and railways). These include (but are not limited to):

- A178;
- A66;
- A1085;
- A1053;
- A1185;
- B1275;

- Seal Sands Road;
- Tees Valley railway line; and
- Stockton to Hartlepool railway line.

3.3.8 The Main Site is not crossed by any Public Rights of Way (PRoW); however, the Teesdale Way long distance/England Coast Path route runs adjacent to the northern boundary of the Main Site. The Teesdale Way also runs between Teesport and Lackenby Steelworks. There are nine PRoW (six footpaths, two bridleways and one byway) within the Proposed Development Site, some of which have the potential to be affected by the Hydrogen Pipeline Corridor and other connection corridor routes. Two PRoWs within Cowpen Bewley Woodland Park will close temporarily during construction; however, the nature of the works in the proximity of the PRoWs will be short term, and the affected PRoWs will not be closed concurrently to allow for a route of access for users within the park.

3.3.9 One PRoW (England Coast Path) will also be temporarily closed at two different points during construction. Each closure will be for six months. In addition, another PRoW (Teesdale Way LDR) will also be closed for a period of six months.

Air Quality

3.3.10 There are no Air Quality Management Areas (AQMAs) within the Site boundary as no AQMAs have been declared in the administrative areas of RCBC, STBC or HBC.

Geology and Hydrogeology

3.3.11 Made Ground is widespread across the Main Site associated with the reclamation of the land from the Tees Estuary using available waste materials (including slag) from the long historical industrial use of the site.

3.3.12 The Proposed Development Site is underlain by superficial deposits including:

- Peat;
- Tidal Flat Deposits;
- Alluvium (Clay, Silt, Sand and Gravel);
- Blown Sand;
- Clay and Silt; and
- Boulder Clay.

3.3.13 The bedrock geology underlying the Proposed Development Site comprises:

- Redcar Mudstone Formation;
- Penarth Group;
- Mercia Mudstone Group; and
- Sherwood Sandstone Group.

3.3.14 The Sherwood Sandstone Group is designated as a Principal Aquifer; the Redcar Mudstone Formation is designated as Secondary undifferentiated aquifer; the

Penarth Formation is designated as a Secondary B aquifer; whilst the Mercia Mudstone bedrock is also designated as Secondary B aquifer.

3.3.15 There are no Groundwater Dependent Terrestrial Ecosystems or Source Protection Zones, Drinking Water Protected Areas, or Drinking Water Safeguard Zones that could potentially be impacted by the Proposed Development. The Proposed Development Site lies within Mineral Safeguarding Areas for salt and gypsum (anhydrite). Impacts of the Proposed Development on these are discussed in the Planning Statement (EN070009/APP/5.2).

Hydrology and Flood Risk

3.3.16 The nearest designated watercourse to the Main Site is the River Tees, located approximately 840 m to the west of the Main Site (at its closest point). The River Tees is designated by the Environment Agency as a Main River.

3.3.17 The North Sea is located approximately 680 m to the north of the Main Site and outside the boundary of the Proposed Development.

3.3.18 There are five Water Framework Directive (WFD) designated surface water bodies within a 1 km radius of the Site, as follows:

- Tees Coastal Water (coastal waterbody);
- Tees Transitional Waterbody (Greatham Creek - estuarine waterbody);
- Cowbridge Beck from Source to North Burn (River Tees Main River);
- North Burn from Source to Claxton Back (River Tees Main River); and
- Tees Estuary (S Bank) (River Tees Main River).

3.3.19 In addition, there are two WFD designated groundwater bodies within a 1 km radius of the Proposed Development Site:

- Tees Mercia Mudstone and Redcar Mudstone; and
- Tees Sherwood Sandstone.

3.3.20 There are numerous localised drains and ditches, pools / surface water bodies and areas of marshy ground within the Proposed Development Site.

3.3.21 Designated Bathing Waters at Coatham Sands are located approximately 1.6 km north of the Proposed Development Site.

3.3.22 The Main Site is located in Flood Zone 1 (area has less than 0.1% annual probability of flooding from rivers or the sea). Outside the Main Site, the Pipeline Corridor to the south of the River Tees is predominantly located in Flood Zone 1 (low risk of flooding from fluvial and/or tidal sources). The exceptions to this are small sections of the Electrical Connection, Water Connection, Hydrogen Pipeline and Other Gases connection corridors which extend into Flood Zone 2 (medium risk of flooding from fluvial and/or tidal sources) and Flood Zone 3a (high risk of flooding from fluvial and/or tidal sources) as they cross or are in proximity to Dabholm Gut.

3.3.23 Land at risk of flooding is more extensive to the north of the River Tees in Seal Sands and Saltholme and a significant amount of the Hydrogen Pipeline Corridor is located

within Flood Zones 2 (medium risk of flooding) and 3 (high risk of fluvial flooding), however, flooding in this area is predominantly from tidal sources. There are, however, ordinary watercourses, such as the Mucky Fleet, Swallow Fleet and Belasis Beck that could pose a risk to small sections of the Hydrogen Pipeline Corridor, predominantly where the connection corridor passes over a watercourse/drain.

3.3.24 The main locations of identified surface water flooding are:

- approximately 275 m to the south east of the Main Site where water has the potential to flood around the A1085/Broadway East roundabout junction. Land in this area is identified at low to high risk of surface water flooding; and
- land within the site boundary between Seal Sands and Cowpen Bewley Road. Land in this area is identified at low to medium risk of surface water flooding.

Cultural Heritage Receptors

3.3.25 There are no designated heritage assets within the Site. There are 26 Scheduled Monuments within 5 km of the Site boundary.

3.3.26 There are 506 listed buildings within 5 km of the Proposed Development Site, 10 of which are Grade I, 41 of which are Grade II* and 455 of which are Grade II. The closest Grade I listed building is at Sir William Turners Hospital, located approximately 0.5 km south-east of the Proposed Development Site. The closest Grade II listed building is Hall's Farmhouse, located approximately 62 m west of the Hydrogen Pipeline Corridor in Billingham. The closest Grade II* listed building is Ivy House located approximately 132 m west of the Hydrogen Pipeline Corridor in Cowpen Bewley. There is a cluster of approximately 24 listed buildings at Kirkleatham, five of which are Grade I and six of which are Grade II* and all are within 1 km of the Proposed Development Site. Marsh House Farm, a Grade II listed building is located approximately 200 m east of the Water Supply Connection corridor near the Main Site.

3.3.27 There are 20 Conservation Areas within 5 km of the Proposed Development Site, the closest of which include the Cowpen Bewley Conservation Area, part of which lies within the Proposed Development Site and the Kirkleatham Conservation Area, which is located approximately 285 m from the Proposed Development Site.

3.3.28 There are three registered parks and gardens within 5 km of the Proposed Development Site as follows:

- Grade II listed Albert Park, Middlesborough, located approximately 3.2 km south-east of the Proposed Development Site;
- Grade II* listed Wynyard Park, Stockton-on-Tees, located approximately 4.3 km west of the Proposed Development Site; and
- Grade II* listed Ropner Park, Stockton-on-Tees, located approximately 4.6 km south-west of the Proposed Development Site.

3.3.29 Wynyard Park and Ropner Park are located at such a distance from the Proposed Development Site which means they are not visible within the area shown in **Figure 4** below.

Landscape and Visual Amenity

3.3.30 The Proposed Development Site is located within National Character Area (NCA) 23: Tees Lowlands NCA. This 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 includes the Main Site and Hydrogen Pipeline, which are mostly located within a heavily industrialised setting. This contrasts with the rural area to the south around Saltholme and west toward Cowpen Bewley, which is largely agricultural in character.

3.3.31 At a regional scale the area to the north of the River Tees in which the Proposed Development Site is located is characterised within the Stockton-on-Tees Landscape Character Assessment (LCA) (WYG Environment, 2011), with the Proposed Development Site being located within the East Billingham to Teesmouth LCA. The Redcar Flats LCA is located immediately north of the Main Site, with part of the Proposed Development Site being located within this LCA. The coastal zone of the LCA is classified as Sensitive Landscape.

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

Major Accidents and Disasters

3.3.33 The Teesside area is a significant industrial hub, with chemical manufacturing and oil and gas facilities in Wilton, Seal Sands and Billingham. Hartlepool nuclear power station is located on the northern bank of the Tees Estuary.

3.3.34 There are a number of Control of Major Accident Hazards (COMAH) regulated sites within a 5 km radius of the Proposed Development Site.

3.3.35 An existing network of buried and above ground pipelines is present within a 5 km radius of the Proposed Development Site, including major hazard pipelines regulated in accordance with the Pipelines Safety Regulations 1996 (HM Government, 1996).

3.3.36 There is also significant infrastructure associated with the transmission and distribution of energy including high voltage (HV) 400 kV overhead power lines present within a 5 km radius of the Proposed Development Site.

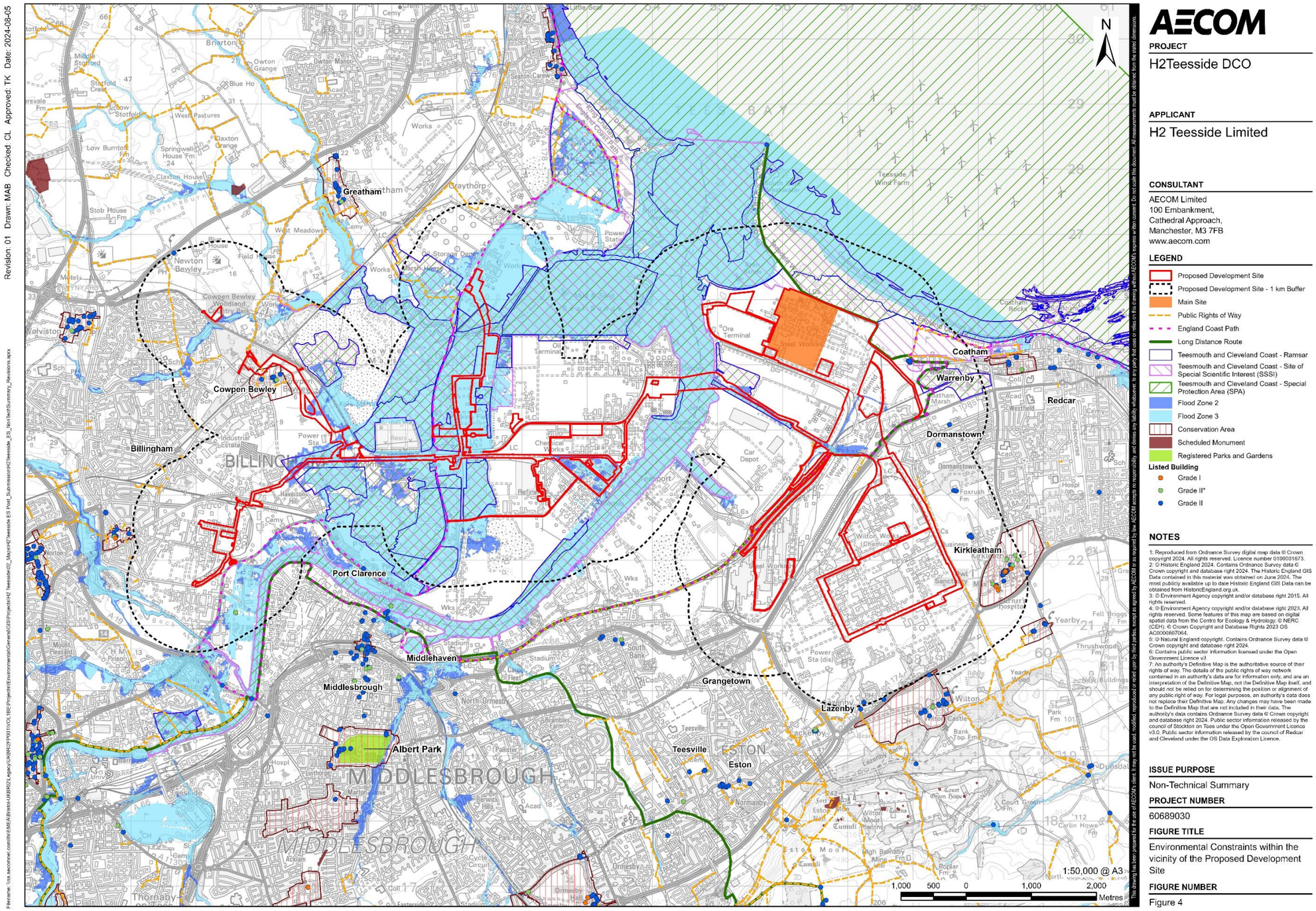

Figure 4: Environmental Constraints within the vicinity of the Proposed Development Site

4.0 THE PROPOSED DEVELOPMENT

4.1.1 This section of the NTS provides a summary of the Proposed Development.

4.1.2 The Proposed Development comprises of an up to 1.2-Gigawatt Thermal (GWth) Carbon Capture and Storage (CCS) enabled Hydrogen Production Facility. The Proposed Development includes associated connections, including a pipeline network to distribute hydrogen to local offtakers and temporary construction compound areas, on land in Redcar and Cleveland, Stockton-on-Tees, and Hartlepool. The Proposed Development is described in detail in Chapter 4: Proposed Development (ES Volume I, EN070009/APP/6.2).

4.1.3 The carbon capture plant will be designed to capture at least 95% of the Carbon Dioxide emitted from the Hydrogen Production Facility, through the use of an amine-based solvent. This captured Carbon Dioxide will be compressed for transport to off-shore storage.

4.1.4 In summary the Proposed Development comprises:

- the Hydrogen Production Facility (to be built in two phases);
- a natural gas pipeline for the supply of gas to the Hydrogen Production Facility;
- an electricity grid connection to provide electricity to the Proposed Development;
- water supply and treatment infrastructure and wastewater treatment and disposal infrastructure;
- hydrogen export pipelines to transport the hydrogen gas to industrial customers in Teesside;
- carbon dioxide capture and compression facilities and a pipeline to the adjacent Northern Endurance Partnership (NEP) facilities. NEP will transport the captured carbon dioxide to permanent storage;
- either a new Air Separation Unit (ASU), or oxygen and nitrogen supply pipelines from an existing ASU to supply oxygen and nitrogen for hydrogen production;
- temporary construction compounds;
- access and public highway improvements; and
- replacement land near Cowpen Bewley.

4.1.5 The Proposed Development will be implemented in two phases:

- Phase 1 will include a single hydrogen production unit, with on-site hydrogen storage and supporting utilities. To transport the hydrogen to industrial customers, the majority of the hydrogen pipeline corridors will also be constructed and completed in this phase too.

- Phase 2 will include a second hydrogen production unit, on-site hydrogen storage and the remainder of the hydrogen pipeline corridors and supporting utilities.

4.1.6 The Proposed Development will operate in accordance with applicable consents, regulations and standards.

4.1.7 The Site Boundary and Main Site, Hydrogen Pipeline Corridor and the other Connections are shown in **Figure 3** above.

4.2 Operational Phase

Hours of Operation

4.2.1 Once operational, the Hydrogen Production Facility will be designed to operate twenty-four hours a day, seven days per week until decommissioning, with brief periods of planned outages such as for maintenance and repair.

Staff

4.2.2 A minimum of 60 staff members will be required at the Site when operating. Peak workforce numbers during operation will be a maximum of approximately 130 staff. However, during 28 day maintenance periods (discussed below), which are likely to occur approximately every four years, there could be up to 400 people on-site.

Maintenance

4.2.3 The objective of plant maintenance is to ensure the Hydrogen Production Facility and the connections operate safely and reliably. Routine maintenance will be planned and scheduled via the maintenance management system with major overhauls occurring approximately once every four years on each unit and last for 28 days. Pipelines will be subject to an Integrity Management Plan, which will ensure they are operating safely and reliably.

Heavy Goods Vehicle Movements and Traffic

4.2.4 The average daily traffic movements will comprise fewer than 15 Heavy Goods Vehicles (HGVs) and approximately 50 light vehicles during regular operation of the Site.

4.2.5 Staff will travel to and from work in various directions, and operational (including maintenance) traffic movements are expected to be very low – significantly lower than those associated with the construction period.

4.2.6 Natural gas would be delivered by pipeline. Other operational and maintenance consumables will be managed to be kept as low as is reasonably practicable, thereby minimising traffic movements.

Hazard Prevention and Emergency Planning

4.2.7 To protect human health, site activities will be safely and responsibly managed. A Health and Safety Plan covering the works, commissioning and operation of the Proposed Development will be prepared by the operator.

4.2.8 Written procedures clearly describing responsibilities, actions and communication channels will be available for operational personnel dealing with emergencies. Procedures will be externally audited, and contingency plans written in preparation for any unexpected incidents.

External Lighting and Signage

4.2.9 Some external lighting and signage would be required to ensure that the Hydrogen Production Facility can operate safely at all times. Lighting would be designed, positioned and directed to prevent or minimise light disturbance to sensitive receptors. Low-energy fittings would be used where possible.

4.2.10 Indicative lighting strategies have been prepared which cover the construction and operational phases of the Proposed Development. These strategies will ensure that safe working conditions are provided, whilst reducing light pollution and any related visual impact on the local environment.

Environmental Management During Operation

4.2.11 The Hydrogen Production Facility will require an Environmental Permit so that any operational impacts on the environment and human health (such as emissions to air, soil, surface and groundwater) are minimised and avoided where possible. In addition, when granted, the DCO will include Requirements to control environmental management matters.

4.3 Decommissioning

4.3.1 Hydrogen production facilities will have a design life of 25 years; however, their use could extend beyond that duration. At the end of its use, the most likely scenario would be that the Proposed Development would be decommissioned, with all above ground structures on the Main Site removed and the ground returned to a condition for future re-use as required by the Environmental Permit. The Applicant will assess at that time whether any infrastructure should be retained for future use.

4.3.2 It is expected that the hardstanding and sealed concrete areas will be left in place. Any areas of the Proposed Development Site which are to be decommissioned and that are below ground level will be backfilled to ground level to leave a levelled area. Underground pipelines are expected to be capped and remain in place. Above ground infrastructure will be decommissioned and removed following completion of the decommissioning activities.

4.3.3 A Decommissioning Environmental Management Plan would be produced at the time of decommissioning. This would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated.

4.3.4 Decommissioning activities will be conducted in accordance with the appropriate guidance and legislation at the time of the Proposed Development's closure.

5.0 CONSTRUCTION PROGRAMME AND MANAGEMENT

5.1 Construction Programme

5.1.1 The construction programme is currently anticipated to commence shortly after the DCO is granted (projected to be in the second half of 2025) and after a final investment decision is made to proceed with the Proposed Development.

5.1.2 The construction phase is expected to last approximately 5 years in two main phases, however detailed construction phasing will be the responsibility of the appointed Contractors.

5.1.3 Table 5-1 presents the Indicative Construction Programme which has been used to inform the EIA.

5.1.4 Each environmental assessment topic within the ES identifies and assesses the reasonable 'worst case' construction scenario for that topic, where relevant.

5.2 Construction Activities

5.2.1 Before the Applicant takes possession of the site, preliminary works will be required. The site preparation and remedial works at the Main Site are expected to have been completed by STDC's demolition and civils contractor to create a suitable development platform for the Proposed Development.

5.2.2 The Applicant would appoint contractors to undertake the construction phase of the Proposed Development. The Applicant would retain overall responsibility for the project and would ensure that the works would be undertaken in accordance with legal requirements.

5.2.3 Construction activities for the Proposed Development itself will include:

- establishment of temporary construction compounds (e.g. site offices, storage areas, security fencing and gates);
- any further remedial works required following, or in place of, STDC remediation;
- earthworks to prepare the Site;
- construction of foundations, which is likely to require the piling of key structures;
- erection of buildings and structures and installation of plant and equipment;
- installation of utilities and utility connections (electricity, natural gas and water);
- construction of the Hydrogen Pipeline Network and Carbon Dioxide Export Pipeline; and
- commissioning (testing) of the plant prior to operation.

5.2.4 The majority of the above construction activities will be undertaken in sequence on the Main Site for both for Phase 1 and Phase 2 of the Proposed Development. The Hydrogen Distribution Network will mostly be installed during Phase 1.

5.2.5 A Final Construction Environmental Management Plan(s) (CEMP) will be prepared prior to construction. The submission, approval and implementation of this will be secured by a requirement of the DCO. A Framework CEMP (EN070009/APP/5.12) has been prepared as part of the ES which sets out the key measures to be followed during construction to control and minimise the impacts on the environment.

5.2.6 Full details of the construction phase is outlined in Chapter 5: Construction and Programme Management (ES Volume I, EN070009/APP/6.2).

5.2.7 Preliminary works for Phase 1 construction are expected to start in the third quarter (Q3) of 2025 (subject to the granting of the DCO), with the main civils works beginning in Q4 of 2025. Construction of Phase 1 is anticipated to last approximately 32 to 36 months and is expected to be complete in Q2 2028.

5.2.8 The early enabling works for Phase 2 may overlap with the commencement of Phase 1 Operation in Q1 and Q2 2028. It is expected that the main civils works for Phase 2 will begin in Q3 of 2028 (after Phase 1 is commissioned) and be completed by the end of 2030. It is proposed that there will be no overlap between the main construction phases of Phases 1 and 2.

Table 5-1: Indicative Construction Programme for the Proposed Development

DEVELOPMENT PHASE	2025				2026				2027				2028				2029				2030			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
PPW Phase 1																								
Construction Phase 1																								
Phase 1 Operation Commences																								
Enabling Works Phase 2																								
Construction Phase 2																								
Phase 2 Operation Commences																								

6.0 ALTERNATIVES AND DESIGN EVOLUTION

6.1.1 The EIA Regulations state that an ES should include a description of reasonable alternatives studied by an applicant and the main reasons for selecting the chosen option, taking into account the environmental effects.

6.1.2 Chapter 6: Alternatives and Design Evolution (ES Volume I, EN070009/APP/6.2) provides this information in respect of the Proposed Development. In summary, alternatives have been considered during the evolution of the Proposed Development including:

- alternative technologies;
- alternative sites/locations;
- alternative locations within the South Tees Development Corporation (STDC) site;
- alternative connection routing and corridors;
- alternative construction corridor methodologies; and
- alternative design options and design evolution.

6.1.3 A scenario in which the Proposed Development is not developed has been considered. This 'do-nothing' alternative would mean low carbon hydrogen is not produced or distributed to customers. Not progressing with the Proposed Development would result in the loss of the opportunity to help achieve national decarbonisation targets the UK is legally bound to meet.

6.1.4 As no alternatives to hydrogen production have been considered given the identified need for the Proposed Development, the consideration of alternative technologies has focused only on the means of delivering a low-carbon hydrogen production facility. Blue hydrogen has been selected by bp as the product of H2Teesside as it uses proven and widely used technology for low-carbon hydrogen production when combined with proven carbon capture technologies. The Proposed Development uses a proprietary low carbon syngas technology based on improved energy efficiency and capture rate, lower associated emissions and beneficial safety outcomes.

6.1.5 Teesside was considered the most appropriate location for the Proposed Development due to:

- its location within the East Coast Cluster and the number of potential industrial offtakers in Teesside to act as customers of the Proposed Development; and
- proximity to the NEP high-pressure compression facility and off-shore Carbon Dioxide Export Pipeline to the Endurance Store.

6.1.6 The suitability of this site for the Proposed Development is reflected by the Government selecting the Proposed Development as a chosen capture project within that Cluster[1].

6.1.7 A number of sites within Teesside were then considered by the Applicant for the location of the Hydrogen Production Facility. The analysis of potential sites focused on identifying a site that supports the development of a viable blue hydrogen project that facilitates industrial connectivity and the path to decarbonisation.

6.1.8 Various factors influenced the site selection process. The criteria that were considered as part of the site selection process included:

- process safety considerations;
- proximity to the east coast and NEP infrastructure, to enable high pressure Carbon Dioxide export to be quickly directed offshore to the Endurance storage facility;
- size – ensuring there is sufficient space for the Proposed Development, that it is safe for construction;
- utilising brownfield land where possible;
- remoteness from residential areas;
- proximity to industrial offtakers that could connect into the hydrogen network;
- proximity to necessary connections including a gas network, electricity transmission network, potential use of existing oxygen and nitrogen supply, water supply and wastewater management options;
- minimising environmental/social effects or risks; and
- discussions with landowners.

6.1.9 Based on the above considerations, two sites were shortlisted for the Main Site location; known as “the Foundry” and “Redcar Bulk Terminal”. These sites were selected primarily because they were judged to be more inherently safe than the alternatives; they are sufficiently remote from any safety sensitive receptors and the large size of the sites offers flexibility to optimise the layout and reduce process safety risk. In addition, both site options provide proximity to existing and potential future users of low carbon hydrogen and access to the off-shore Endurance carbon store via NEP’s nearby proposed infrastructure, and both Main Site options could be easily connected to the required infrastructure (including natural gas, water and electrical). The Main Site location was chosen as it is directly adjacent to the NEP on-shore infrastructure thus simplifying the Carbon Dioxide export pipeline routeing.

6.1.10 The routes of connection corridors, including the hydrogen pipeline, take into consideration the location of sensitive environmental receptors including but not limited to statutory designated sites within the area. Where necessary, the selected

[1] Department for Energy Security & Net Zero (DESNZ). Cluster sequencing Phase-2: Track-1 project negotiation list, March 2023.

routes seek to avoid environmentally sensitive areas by utilising existing established pipeline routes, and/or the least intrusive construction methodologies (e.g., trenchless methods, as opposed to use of open-cut trench techniques).

6.1.11 Various construction methodologies have been considered, including trenchless crossings (such as HDD or micro-bored tunnel), below ground open cut trench, the installation of new or existing above ground support structures in existing pipeline corridors, and the repurposing and reuse of existing pipelines (where possible). These decisions have been informed by design work, discussions with landowners and statutory consultees, and environmental constraints and survey information.

6.1.12 Throughout the ongoing design process, consideration has been given to a range of design options. These decisions have, where appropriate, been informed by environmental appraisal and assessment work and by consultation with stakeholders, and the design has evolved through a continuous process of environmental assessment, consultation, and development. The design will continue to be refined within the Rochdale Envelope parameters through the Front End Engineering Design process.

6.1.13 The environmental effects of these alternatives have been compared to inform the Proposed Development layout and design.

6.1.14 The Proposed Development includes an appropriate degree of flexibility in the dimensions of buildings and structures to allow for the selection of the preferred technology and contractors.

6.1.15 In order to ensure a robust assessment, a maximum built ‘envelope’ has been defined to accommodate this necessary flexibility and to enable the EIA to consider the ‘worst case’. For example, the landscape and visual impact assessment has assessed the largest massing of buildings that could be required.

6.1.16 It is considered that the choice of technology, the choice of site, the inclusion of the associated connections and extent of the hydrogen pipeline network are appropriate based on the consideration of alternatives that has been undertaken as part of the EIA.

6.1.17 The Proposed Development design and layout (including the routeing of the connections) have continued to evolve following consultation and also consideration of access points, site layout, equipment sizing and capacity, land ownership, interaction with other developments and the phasing of construction. Site boundary changes, biodiversity mitigation proposals, water connection options, and environmental effects of each option have been appraised alongside technical and commercial considerations. This design evolution has resulted in the reduction of land take and environmental effects during the pre-application process due to the Proposed Development being delivered in a smaller area.

7.0 SUMMARY OF ENVIRONMENTAL EFFECTS

7.1 Air Quality

Introduction

7.1.1 Chapter 8: Air Quality (ES Volume I, EN070009/APP/6.2) considers potential impacts from the Proposed Development on both human health and ecological receptors.

7.1.2 There are no Air Quality Management Areas (AQMAs) identified in the area with the potential to be affected by the Proposed Development.

7.1.3 Baseline air quality has been determined using available local authority and Defra published data and data collected by the Applicant.

7.1.4 The air quality assessment uses screening tools and computer models to predict the dispersion of air emissions from the Proposed Development including emissions associated with the construction of the Proposed Development and emissions from the proposed flare and boiler stack (chimney) of the operational development. These predict concentrations of pollutants in ambient air which are compared to national air quality standards where available, or other appropriate levels as agreed with regulators.

Effects During Construction

7.1.5 During construction, impacts could arise due to:

- dust from demolition, remediation and construction activities;
- emissions from construction vehicles and mobile construction plant; and
- emissions from construction phase road traffic (using traffic data in the form of traffic flows, composition and speed).

7.1.6 Through the use of standard construction management measures, which reduce dust and emissions from demolition, site clearance and site preparation activities, emissions to air from construction activities are assessed to have no significant adverse effects on human or ecological receptors. Such measures would include standard best practice construction measures such as appropriate storage of materials, suppression of dust from soil movement and material storage, cleaning of vehicles and locating construction plant away from sensitive receptors; these measures would be incorporated into the Final CEMP(s).

7.1.7 Based on expected vehicle movements, construction traffic air impacts are considered to be negligible at all human receptors and the effect is therefore not significant.

7.1.8 No additional mitigation other than the use of the Final CEMP(s) has been identified as necessary for the construction phase of the Proposed Development.

Effects During Operation

7.1.9 During operation, impacts could arise due to process emissions from the operational Proposed Development.

7.1.10 Emissions associated with operational road traffic were not assessed because the volume of operational traffic will be much lower than during construction and will therefore not have a significant effect.

7.1.11 The carbon capture plant uses amine-based solvents to extract Carbon Dioxide from the emissions. The plant uses a closed loop system where amine Carbon Dioxide solvent is continuously recycled. No emissions of amines to air are therefore anticipated.

7.1.12 Dispersion modelling has been used to calculate the predicted concentrations of pollutants arising from the emissions to atmosphere for the operation of the Proposed Development.

7.1.13 Predicted ground level concentrations of relevant air pollutants (principally nitrogen oxides) due to air emissions from the operation of the Proposed Development have been assessed. No significant effects are expected to occur as a result of the Proposed Development at the identified human receptors. A flare is required for safety reasons. If the flare needs to be used there will be no visible plume.

7.1.14 The deposition of nitrogen on sensitive ecological receptors from the air emissions of nitrogen oxides has also been calculated. No significant effects are expected to occur as a result of the Proposed Development at the Coatham Sands area of the Teesmouth and Cleveland Coast SSSI based on the predicted concentrations and the areas of potential impact.

7.1.15 Emissions from the Proposed Development will be controlled and regulated by the Environment Agency through an Environmental Permit that will be required for operation and in accordance with the use of Best Available Techniques (BAT). The Permit must be granted prior to operation of the Proposed Development. An application for a permit is being prepared by the Applicant for submission to the Environment Agency for determination alongside the DCO application.

Effects During Decommissioning

7.1.16 Air quality effects experienced during decommissioning are expected to be equal to or less than during construction. No significant effects are therefore predicted.

Summary

7.1.17 In summary no significant Air Quality effects are predicted during the construction or operation (including maintenance) and decommissioning of the Proposed Development.

7.2 Surface Water, Flood Risk, and Water Environment

Introduction

7.2.1 Chapter 9: Surface Water, Flood Risk and Water Resources (ES Volume I, EN070009/APP/6.2) presents the findings of the assessment of likely significant effects on the surface water environment (including inland, estuarine, groundwater and coastal surface waters) and flood risk as a result of the Proposed Development.

7.2.2 Key water bodies that may receive runoff or discharges from the Proposed Development during construction, operation and decommissioning have been identified, and the potential contamination risk to these water bodies has been assessed. The Study Area for surface water has been defined based on the potential for impacts to occur.

7.2.3 The main surface watercourses within or close to the Proposed Development are outlined in Section 3 of this NTS. There are also numerous minor watercourses and water features in and around the Proposed Development. The Site is not located within a Drinking Water Protected Area, Drinking Water Safeguard Zone or near any groundwater Source Protection Zones.

7.2.4 The Main Site is located within Flood Zone 1 (low risk) as defined by the Environment Agency. Areas of the Hydrogen Distribution Network along the Dabholm Gut and through North Tees and the Electrical Connection Corridor lie within Flood Zones 2 (medium risk) and 3a (high risk).

Effects During Construction

7.2.5 The assessment considered potential effects for the construction phase in relation to the following:

- temporary impacts on surface water quality;
- changes to the physical character and water content of watercourses due to construction;
- increase in surface water run-off and groundwater flood risk.

7.2.6 Before construction a Water Management Plan will be prepared containing measures to control impacts on the water environment.

7.2.7 Effects during the construction phase have been identified, and all are predicted to be not significant. Potentially significant effects on all surface waterbodies have been avoided, primarily by using trenchless technologies for pipeline installation across major watercourses thereby not disturbing the bed or bank habitats or mobilising sediments.

7.2.8 Potential significant adverse effects to water quality from suspended fine sediments and accidental spillages will be prevented or minimised through the use of preventative measures described in the Final CEMP(s).

7.2.9 While flood risk is low at the Main Site, flooding arising from rainfall falling on the Main Site will be minimised through the use of an appropriate drainage design. Where construction in the connection corridors is required in areas of higher flood risk, those works are relatively minor in nature, comprising construction of a pipeline that will either be located on existing pipe racks or buried underground. These works will be managed through the implementation of the Final CEMP(s) to minimise the risk of increased flooding, and by siting the storage of materials away from areas of higher flood risk to reduce the risk of contamination. A Flood Emergency Response Plan will be prepared.

Effects During Operation

7.2.10 The operational assessment considered potential effects for the operational phase in relation to long term impacts on surface water quality; long term impacts on waterbodies as a result of atmospheric emissions; increase in surface water and groundwater flood risk; and potable water demand. This assessment identified no significant effects.

7.2.11 A detailed drainage strategy, which will have regard to the findings of the Flood Risk Assessment (FRA) and water quality assessment and will be based on sustainable drainage principles, will be defined and prepared for the Proposed Development in consultation with the Environment Agency, the Lead Local Flood Authorities (RCBC, STBC and HBC) and other statutory bodies. The Applicant will incorporate rainwater harvesting across suitable site buildings to minimise overall water consumption.

7.2.12 The proposed drainage system would provide attenuation capacity and treatment of runoff to ensure potential adverse effects on water quality are avoided.

7.2.13 There will be no change in the nutrient nitrogen status of the Tees Estuary associated with consented discharges.

Effects During Decommissioning

7.2.14 Water quality monitoring and good practice control measures will be used during decommissioning and no significant effects are expected.

Summary

7.2.15 In summary no significant effects are predicted for surface water, water resources and flood risk during the construction or operation (including maintenance) and decommissioning of the Proposed Development.

7.3 Geology, Hydrogeology and Contaminated Land

Introduction

7.3.1 Chapter 10: Geology, Hydrology and Contaminated Land (ES Volume I, EN070009/APP/6.2) presents the likelihood for the Proposed Development to affect geology, soils and contaminated land and potentially cause effects on human, surface water and groundwater receptors. Consideration has been given to geology, superficial soils and bedrock, geological and hydrogeological designations, soils and agricultural land classification, existing contamination and minerals rights.

7.3.2 A desk-based assessment of historical ground condition information and information from historical site investigations have been used to identify the potential effects associated with ground conditions. Additional ground investigation will be undertaken in advance of detailed design/construction.

Effects During Construction

7.3.3 The construction phase of the Proposed Development will involve activities that may have potential impacts on the soils, geology, hydrogeology and potentially contaminated land resources. Following a ground investigation, a Final CEMP(s) will be prepared including a materials management plan and a site waste management

plan. These will set out what needs to be done to manage and control any contamination risks (including targeted remediation involving either recovery of soils on-site or removal and disposal at a suitably permitted facility).

7.3.4 Potential impacts during the construction phase include:

- mobilisation of contaminants during remediation and construction;
- changes to hydrogeological regimes (e.g. during dewatering activities); and
- changes to surface water quantity and quality.

7.3.5 Impacts will be managed by appropriate construction mitigation measures (which will be outlined in the Final CEMP(s)) and as such no significant adverse effects are anticipated on people, soil, water or mineral resources.

Effects During Operation

7.3.6 The operational impacts of the Proposed Development with regards to geology, hydrogeology and contaminated land are associated with the permanent site infrastructure which includes plant and buildings, roadways, service corridors and areas of hardstanding.

7.3.7 The potential impacts (without mitigation) that could arise during the operational phase of the Proposed Development include:

- permanent soil loss where permanent infrastructure is installed. However, the loss is likely to be negligible given the low quality of the existing soils and the widespread existing industrial development (hardstanding) already present across the Main Site; and
- impacts to soil quality, groundwater and watercourses, which could potentially occur during operation as a result of accidental spills from the handling or leakage of fuels, lubricants, stored chemicals and process liquids.

7.3.8 However, with appropriate management, housekeeping and preventative maintenance practices (such as appropriate storage of potentially contaminating chemicals), as required by the Environmental Permit that will be needed for the operational Site, potential impacts to soil and groundwater will be minimised. As such, significant adverse effects are not predicted to occur.

Effects During Decommissioning

7.3.9 With a decommissioning plan in place, impacts are considered to be similar to those anticipated during construction and no significant effects are expected.

Summary

7.3.10 In summary no significant effects are predicted with regards to geology, hydrogeology and contaminated land during the construction or operation (including maintenance) and decommissioning of the Proposed Development.

7.4 Noise and Vibration

Introduction

7.4.1 Chapter 11: Noise and Vibration (ES Volume I, EN070009/APP/6.2) presents the likelihood for the Proposed Development to generate noise and vibration which could have effects on sensitive receptors.

7.4.2 Potential noise sensitive receptors – residential, industrial (local offices), and ecological (birds associated with the Teesmouth and Cleveland Coast SSSI, SPA and Ramsar site) – have been identified around the Site boundary and representative baseline monitoring undertaken. Noise levels during construction and operation of the Proposed Development have been predicted and the results compared with measured baseline noise levels at the identified receptors during the day and night. National standards have been applied to determine whether there is the potential for significant effects without further mitigation measures being applied. The assessment has also considered the potential for vibration effects from construction, and operation of the Proposed Development.

Effects During Construction

7.4.3 The assessment considered potential effects during construction in relation to the following:

- noise and vibration levels during site clearance, remediation, construction and piling works; and
- predicted changes in road traffic noise levels on the local road network.

7.4.4 Based on the conservative assumptions made, no significant noise effects are predicted on residential, industrial, or ecological receptors through the implementation of best practice measures to control construction noise to agreed construction noise thresholds, plus additional specific mitigation at Cowpen Bewley and Kirkleatham, that will be applied in accordance with Requirements of the DCO. These include, limiting construction working hours, using best practicable means to control noise, use of noise barriers to limit noise impacts on residents of Cowpen Bewley, bird species in the Teesmouth and Cleveland Coast SPA and seals on the shore.

Effects During Operation

7.4.5 The assessment has concluded that no significant operational noise effects are predicted to occur at residential, industrial or ecological receptors during operation.

Effects During Decommissioning

7.4.6 Noise levels resulting from future demolition of the Main Site have been predicted for the nearest sensitive receptors and no significant effects are predicted. It is assumed the hydrogen pipeline and other connection infrastructure will be left in-situ.

Summary

7.4.7 In summary no significant effects on residential, industrial or ecological receptors are predicted with regards to noise and vibration during the construction or operation (including maintenance) and decommissioning of the Proposed Development.

7.5 Ecology and Nature Conservation (including Aquatic Ecology)

Introduction

7.5.1 Chapter 12: Terrestrial Ecology and Nature Conservation (ES Volume I, EN070009/APP/6.2) presents the likelihood for the Proposed Development to have effects on terrestrial and aquatic ecology, such as habitats and protected species (including bats).

Effects During Construction

7.5.2 To avoid impacting the designated sites or the protected species, the Proposed Development has been designed to use existing pipeline corridors where possible. The Applicant has also chosen construction methods which will minimise disturbance of habitats and species.

Designated Sites

7.5.3 As trenchless technologies for pipeline installation will be used during construction, there are no pathways by which there would be the potential for direct impacts (including noise and vibration) to designated sites including Teesmouth and Cleveland Coast SSSI, SPA and Ramsar site. Therefore, direct impacts during construction on these sites have been mitigated by design and no further mitigation is required.

Habitats

7.5.4 The key potential construction impacts on ecology are largely due to the loss of non-designated habitats, as well as noise and visual disturbance, and changes to the water environment. Significant effects have been predicted for Cowpen Bewley Woodland Park Local Wildlife Site and Local Nature Reserve because of impacts on woodland habitat and soil and indirect effects from pollution and direct loss of woodland, damage to trees and effects from dust, noise and vibration and artificial lighting from construction work. Significant effects have also been predicted for swamp habitats such as to the North of Greatham Creek and at Cowpen Bewley Woodland Park due to direct loss of habitat during construction.

7.5.5 The Framework CEMP includes measures to avoid and minimise impacts to habitats and species, such as the use of noise abatement barriers and seasonal working to avoid sensitive times. During construction an experienced ecologist will be present to supervise works and ensure these measures are implemented. Replacement land at Cowpen Bewley, adjacent to Cowpen Bewley Woodland Park, and currently in agricultural use has been identified as mitigation for the loss of woodland planting in the Woodland park. The new area of woodland creation within the Replacement Land will be implemented as enhancement to the area of woodland lost within

Cowpen Bewley. The Applicant will work with Stockton-on-Tees Borough Council to agree the layout and planting of this land.

Species

7.5.6 No significant effects are predicted on terrestrial species as a consequence of construction activities. However appropriate pre-construction surveys will be undertaken prior to works commencing to confirm that no protected species are present in working areas.

Effects During Operation

7.5.7 During operation, potential impacts to ecology from the Proposed Development include noise and visual disturbance. However, with the project complying with an Environmental Permit and having an Environmental Management System, no significant effects are expected. No impacts from aerial emissions of nitrogen compounds are anticipated.

7.5.8 The Applicant has prepared an Outline Landscape and Biodiversity Management Plan which provides a framework for delivering the landscape and ecological strategy and the successful establishment and future management of proposed landscape works associated with the Proposed Development. It sets out the short and long-term measures and practices that will be implemented by the Applicant to establish, monitor and manage landscape and ecology mitigation measures embedded in the design. The Applicant will reduce effects by recreating habitats which are temporarily disturbed by the works and improve their condition where possible. For example, adding bankside planting to watercourses.

Effects during Decommissioning

7.5.9 A Decommissioning Environmental Management Plan would be in place to provide mitigation measures to avoid impacts to habitats and species. Any surveys that are needed would be conducted approximately one year before decommissioning to inform this plan and measures that are required. With this in place, no significant effects are anticipated.

Summary

7.5.10 In summary significant effects are predicted for direct loss of swamp habitat to the North of Greatham Creek and at Cowpen Bewley Woodland Park. In addition, there are significant effects predicted at Cowpen Bewley Woodland Park Local Wildlife Site because of impacts on the woodland caused by construction work. All other receptors identified within this assessment are predicted to experience no likely significant effects as a result of the construction, operation or decommissioning of the Proposed Development.

7.5.11 Replacement land at Cowpen Bewley, adjacent to Cowpen Bewley Woodland Park, and currently in agricultural use has been identified as mitigation for the loss of woodland planting in the Woodland Park. The new area of woodland creation within the Replacement Land will be implemented as enhancement to the area of woodland lost within Cowpen Bewley. The Applicant will work with Stockton-on-Tees Borough Council to agree the layout and planting of this land.

7.6 Ornithology

Introduction

7.6.1 Chapter 13: Ornithology (ES Volume I, EN070009/APP/6.2) presents a summary of the likelihood for the Proposed Development to have effects on birds and associated habitats and designated sites.

7.6.2 The Site is situated within the Teesmouth and Cleveland Coast Special Protected Area SPA/Ramsar site and the Teesmouth and Cleveland Coast SSSI. In addition, a Report to Inform Habitats Regulations Assessment (HRA) has been prepared and submitted with the DCO application.

Effects During Construction

7.6.3 Potential impacts to ornithological receptors as a result of the construction of the Proposed Development that have been included within the assessment include:

- temporary degradation or losses of habitat;
- disturbance of birds, principally from noise;
- impacts from emissions such as dust, particulate matter, from construction plant and construction traffic;
- increases in surface water run-off and flood risk;
- changes in water quality from run-off to surface waters affecting wetland habitats used by birds and distribution/quality of foraging resources;
- permanent losses of habitat used by nesting, roosting and feeding birds where new infrastructure is installed;
- permanent losses of and physical impacts on subtidal habitats; and

7.6.4 No likely significant effects have been identified following consideration of the relevant ornithological baseline conditions, potential impact pathways and the proposed embedded mitigation to be used during construction, which will be specified in the Final CEMP(s) (including use of trenchless technologies for crossing Coatham Dunes and Sands and use of bored rather than impact piling).

Effects During Operation

7.6.5 Potential impacts to ornithological receptors as a result of the operation of the Proposed Development include:

- disturbance of birds, principally from noise (Main Site and hydrogen pipeline);
- increases in surface water run-off and flood risk;
- emissions from operational vehicular traffic;
- point source emissions of NOx, acid and nutrient nitrogen;
- impacts (thermal and chemical) on marine and benthic organisms arising from treated water discharge, resulting in reductions of available foraging resources for some fish-eating birds; and

- impacts of tall structures as a barrier to movement of birds for which Teesmouth and Cleveland Coast Ramsar, SPA and SSSI are designated.

7.6.6 Impacts predicted to arise as a result of the Proposed Development will be controlled, mitigated or compensated for through appropriate design and mitigation measures and the location of the Main Site. No significant effects on ornithological receptors are anticipated during the operation of the Proposed Development.

Effects During Decommissioning

7.6.7 With a Decommissioning Environmental Management Plan (DEMP) in place, impacts are considered similar to those experienced during construction and no significant effects are expected.

Summary

7.6.8 In summary no likely significant effects on ornithology are anticipated as a consequence of construction or operation (including maintenance) of the Proposed Development.

7.7 Marine Ecology

Introduction

7.7.1 Chapter 14: Marine Ecology and Nature Conservation (ES Volume I, EN070009/APP/6.2) presents a summary of the likely impacts on marine ecology (habitats and species) and nature conservation as a result of the Proposed Development.

7.7.2 Marine ecological receptors have been identified in and around the Proposed Development through a desk-based study and ecological surveys in the surrounding area.

7.7.3 The Site is situated adjacent to (or in the case of the Tees and Greatham Creek crossings) under the Teesmouth and Cleveland Coast Special Protection Area SPA/Ramsar site and the Teesmouth and Cleveland Coast SSSI. These sites are designated for the protection of breeding/ non-breeding bird species and other important waterfowl species associated with the site and include a range of coastal habitats (sandflats and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes) within and around the Tees Estuary. A number of protected or notable marine animal species have been identified as present, or potentially present, within the marine ecology study area which incorporates some areas of the Greater North Sea Ecoregion. These include grey seal and harbour (or common) seal.

Effects During Construction

7.7.4 During construction there is potential for impacts to marine species and habitats including:

- artificial lighting and changes in their visual surroundings;
- changes in water quality from spills;

- collision risk between vessels and marine mammals;
- changes in noise levels above water; and
- the introduction or spread of invasive non-native species.

7.7.5 There is potential for a significant effect from changes in noise levels which may affect seals during important periods for breeding and moulting at Seal Sands. The Applicant will use noise reduction barriers during construction of the hydrogen pipelines at particular sites near to Seal Sands. With this in place, this effect is not expected to be significant.

7.7.6 With the implementation of measures including visual screens, a lighting strategy and the Construction Environmental Management Plan, no significant effects are expected.

Operation Assessment

7.7.7 The potential impacts to marine ecology during operation include:

- changes in noise levels above water;
- air quality impacts; and
- the discharge of treated wastewater affecting water quality and temperature.

7.7.8 Modelling of water quality and noise levels has identified that no significant effects during operation are predicted. The assessments have also identified that the Proposed Development is nutrient neutral (meaning there will be no net increase of nutrients as a result of the Proposed Development).

Effects During Decommissioning

7.7.9 With a Decommissioning Environmental Management Plan in place, impacts are considered to be the same as those during construction and no significant effects are expected.

Summary

7.7.10 In summary no likely significant effects on marine ecology are anticipated as a consequence of construction or operation (including maintenance) and decommissioning of the Proposed Development.

7.8 Traffic and Transport

Introduction

7.8.1 Chapter 15: Traffic and Transport (ES Volume I, EN070009/APP/6.2) identifies the likelihood for the Proposed Development to have effects on traffic and transport in the area surrounding the Proposed Development. The assessment considers the predicted number of vehicle movements generated during the construction and operation of the Proposed Development, and the sensitivity (including pedestrian and cyclist safety) and capacity of the local road network within a defined study area.

Effects During Construction

7.8.2 The construction phase will result in temporary increases of traffic flows, including HGVs. However, the assessment concludes that these additional traffic movements will not result in any significant effects. Any abnormal loads would be timed to minimise disruption following consultation with the local authority and secured through the requirements in the DCO; where possible the nearby Redcar Bulk Terminal and Teesport will be used for delivery of abnormal loads to minimise HGV movements on the public highway.

7.8.3 A construction worker traffic management plan and a construction HGV traffic management plan will be developed by the contractor in accordance with a Requirement in the draft DCO in order to manage and where possible, reduce the number of vehicles required. Consequently, the effects of construction traffic on all road links and junctions within the study area are considered to be not significant.

Effects During Operation

7.8.4 Due to the very low traffic flows anticipated during operation, an assessment of traffic and transport during operations has been scoped out.

Effects During Decommissioning

7.8.5 With a Decommissioning Environmental Management Plan in place, impacts are considered to be the same as those during construction and no significant effects are expected.

Assessment of Cumulative Effects

7.8.6 A cumulative assessment of traffic and transport was undertaken to determine if the traffic from other committed developments in the area could result in new or worse significant effects when considered together with the traffic from the Proposed Development.

7.8.7 It was concluded that if the Proposed Development and other committed developments adhered to control and management measures contained in Construction Traffic Management Plans and Construction Worker Travel Plans, effects would be limited and not significant.

Summary

7.8.8 In summary no likely significant effects on traffic and transport are anticipated as a consequence of construction or operation (including maintenance) and decommissioning of the Proposed Development.

7.9 Landscape and Visual Amenity

Introduction

7.9.1 Chapter 16: Landscape and Visual Amenity (ES Volume I, EN070009/APP/6.2) addresses the likelihood for the Proposed Development to have effects on landscape character and visual amenity.

7.9.2 The Study Area for landscape and visual effects includes areas where it is considered that there is potential for significant direct or indirect effects on landscape character or sensitive views due to the construction or operation of the Proposed Development.

7.9.3 The assessment is based upon the largest possible dimensions for the Proposed Development and on a worst-case flare height of up to up to 108 mAOD for the absorber stack (which equates to 100 m above ground level) and 78 mAOD for the auxiliary boiler stack, as these are considered to represent the worst-case in terms of visual impacts. Even using these dimensions, it is considered highly unlikely that significant effects would occur outside of the 10 km study area.

7.9.4 Due to the existing industrial character of the setting of the Main Site and surrounding landscape, it is anticipated that there is a low likelihood that construction and operational effects will result in a long-term change to the existing landscape character at local, regional or national scale.

Effects During Construction

7.9.5 During construction, views for residential receptors at various viewpoints surrounding the Proposed Development will either be oblique or contain clear views of structures associated with the construction of the Proposed Development. At some viewpoints, views of ground level construction activities will be limited as a result of intervening vegetation and existing large-scale structures. No significant effects are predicted at residential receptors.

7.9.6 Moderate adverse (significant) effects on visual amenity are expected to occur to recreational receptors on the England Coast Path and Redcar seafront. These are likely to experience short-term, temporary and direct moderate adverse (significant) effects during construction as a result of the close distance to the Main Site and limited intervening vegetation.

Effects During Operation

7.9.7 During operation no significant effects on residential receptors are predicted. There are expected to be moderate adverse (significant) effects for visual amenity at Viewpoint 7: England Coast Path as a result of the path's close proximity to the Main Site. It is not possible to eliminate the visual impacts associated with the Proposed Development on the Main Site due to its scale. Mitigation is therefore not possible to reduce the visual intrusion of the buildings in the landscape and minimise impact on visual amenity. However, as far as reasonably practicable, given the industrial setting, the design of the Proposed Development will seek to minimise adverse impacts on visual amenity through the selected building materials and colours.

Effects During Decommissioning

7.9.8 Likely significant effects as a result of the decommissioning of the Proposed Development are predicted to be similar to that of the construction phase. There will be significant effects on visual amenity experienced for recreational users of the England Coast Path as well as the Redcar seafront. This is because of the close distance to the Main Site and limited intervening vegetation.

Summary

7.9.9 In summary there are no likely significant effects on landscape and residential receptors anticipated as a consequence of construction and operation (including maintenance) and decommissioning of the Proposed Development. Significant adverse effects on some visual amenity receptors are predicted during construction (and decommissioning) due to the close proximity of the Main Site to recreational receptors and during operation due to the scale of the Proposed Development. As far as reasonably practicable, these effects will be mitigated through siting and design.

7.10 Cultural Heritage

Introduction

7.10.1 Chapter 17: Cultural Heritage (ES Volume I, EN070009/APP/6.2) considers the likelihood for the Proposed Development to have effects on cultural heritage assets, such as archaeology, built heritage and the historic landscape, either permanently or temporarily.

7.10.2 A summary of cultural heritage receptors is outlined in Section 3 of this NTS.

Effects During Construction

7.10.3 The assessment considers the likelihood of temporary and permanent effects to heritage assets as a result of changes to their setting and permanent loss of heritage value as a result of construction related activities.

7.10.4 Impacts on archaeological remains or cultural heritage assets during construction would be avoided by design through use of routeing, trenchless technologies and the use of existing service corridors for pipelines. Potential impacts on archaeological remains associated with a Romano-British settlement which may lie within the Hydrogen Connection Corridor and boundary ditches south-east of Cowpen Bewley will be mitigated by a programme of archaeological investigations prior to or during construction.

7.10.5 A protocol will be adopted in order to mitigate any impacts to previously unknown archaeological assets that may be encountered during construction and will ensure that any finds are promptly reported, archaeological advice is obtained, and any recovered material receives the appropriate level of stabilisation, recording and conservation, proportionate to its heritage value.

Effects During Operation

7.10.6 There would be no impacts to buried archaeological remains during operation. The Proposed Development would represent a new component into an existing industrial landscape. Its inclusion within the visual setting of heritage assets is not incongruous to the current setting and would not result in significant change the assets' setting or value.

Effects During Decommissioning

7.10.7 With a Decommissioning Environmental Management Plan in place, impacts are considered to be the same as those during construction and no significant effects are expected.

Summary

7.10.8 In summary no likely significant effects on cultural heritage are anticipated as a consequence of construction and operation (including maintenance) and decommissioning of the Proposed Development.

7.11 Socio-Economics and Land Use

Introduction

7.11.1 Chapter 18: Socio Economics (ES Volume I, EN070009/APP/6.2) addresses the likelihood for the Proposed Development to have effects on employment, local businesses and the local population during the construction, operation and decommissioning phases. The assessment has taken into account the demographics of the area surrounding the Proposed Development when considering the impacts which are likely to occur.

7.11.2 Economic benefits can arise directly (through employment of local people) and indirectly (e.g. during the construction phase, when contractors may be using local accommodation and other amenities).

Effects During Construction

7.11.3 Net construction employment created by the construction phase of the Proposed Development is predicted to have a beneficial (significant) short-term effect in the local area with increased local demand for accommodation having a positive impact on the local economy.

7.11.4 Construction is anticipated to last for up to four years and is estimated to generate a minimum of 780 net construction jobs to support the Proposed Development, the majority from the Middlesbrough and Stockton area. Proposed skills and employment enhancement programmes provided by the Applicant are also expected to bring a positive impact.

7.11.5 Minor disruption on the local community, businesses, tourism and wider amenities is expected during construction but it is not expected to generate any significant effects. Additionally, use of some public rights of way and public open space at Cowpen Bewley may be temporarily disrupted during construction which will require either controlled access to allow crossing of construction areas or, as a last resort, temporary closures or diversions.

Effects During Operation

7.11.6 The Proposed Development will generate long-term jobs once operational. Operation of the Proposed Development is estimated to generate a minimum 60 long-term jobs (130 jobs if both Phases are operational). The direct, indirect and

induced employment created by the operational phase of the Proposed Development is likely to have a neutral long-term effect.

7.11.7 There is expected to be a negligible effect on community disruption and demographic change.

Effects During Decommissioning

7.11.8 With a Decommissioning Environmental Management Plan in place, impacts are considered to be the same as those during construction and no significant effects are expected.

Summary

7.11.9 In summary significant (beneficial) effects on socio-economics are anticipated as a consequence of construction and decommissioning by having a positive impact on the local economy through the employment of construction workers.

7.12 Climate Change

Introduction

7.12.1 Chapter 19: Climate Change (ES Volume I, EN070009/APP/6.2) assesses the likelihood for the Proposed Development to have effects on climate, as well as the impact of future climate change on the Proposed Development and surrounding environment.

7.12.2 The assessment includes:

- Greenhouse Gas impact assessment (the potential effect the Proposed Development may have on GHG emissions and therefore climate change);
- In-combination climate change impacts (ICCI) (the combined effect of the Proposed Development and climate change on surrounding receptors); and
- Climate change resilience review (the resilience of the Proposed Development to future projections for climate change).

GHG Assessment Summary

7.12.3 A lifecycle approach has been taken to assess greenhouse gas emissions at the construction and operation stages.

7.12.4 No significant adverse effects as a result of greenhouse gas emissions are predicted during construction or operation of the Proposed Development. Additionally, as the purpose of the Proposed Development is to provide low carbon hydrogen, which will help in the transition to a low carbon economy; it is considered that the Proposed Development will have a beneficial effect as the use of the hydrogen as a fuel source will lead to carbon savings in comparison to natural gas, diesel and coal being used as a fuel source.

In-Combination Climate Impact Assessment Summary

7.12.5 The In-combination Climate Change Impact Assessment has identified no likely significant effects expected to arise.

Climate Change Resilience Summary

7.12.6 The design includes measures to reduce the likelihood or consequence of impacts to the Proposed Development occurring as a result of potential climate change hazards that have been identified. No significant effects from climate resilience are therefore predicted.

7.13 Major Accidents and Disasters

7.13.1 Chapter 20: Major Accidents and Disasters (MA&Ds) (ES Volume I, EN070009/APP/6.2) presents an assessment of the likelihood for the Proposed Development to result in major accidents and disasters during construction or operation.

7.13.2 Major accidents are incidents such as fires and explosions that could result in serious harm to people. They also have the potential to cause widespread damage to property and the environment. Disasters can be naturally occurring events, such as earthquakes, landslides and flooding. The impact of MA&Ds can be very significant, but the likelihood of occurrence is low.

7.13.3 A number of hypothetical MA&Ds scenarios during construction and operation were identified for the Proposed Development which would have significant consequences to people and the environment, but at a very low probability of occurrence. These scenarios include collapse of structures, pipeline strike, fire, explosion, toxic release, domino effects and road traffic accidents.

7.13.4 The engineering design, construction and operation of the Proposed Development will incorporate appropriate standards and mitigation measures necessary to reduce the risks of MA&Ds to an acceptable level, i.e. as low as is reasonably practicable, which is the standard expected by the Regulatory Authorities (Health and Safety Executive (HSE) and Environment Agency). As well as an Environmental Permit, the operational plant will be regulated by the HSE as a Control of Major Accident Hazards (COMAH) site.

7.13.5 Consequently, based on the design of the Proposed Development and the proposed operational control measures to be applied, no significant effects have been identified in relation to MA&Ds.

7.14 Materials and Waste Management

Introduction

7.14.1 Chapter 21: Materials and Waste Management (ES Volume I, EN070009/APP/6.2) identifies the likelihood for the Proposed Development to have effects on landfill capacity, waste sites that are allocated or safeguarded, and the consumption of key materials.

Effects During Construction

7.14.2 The Applicant will require a range of materials for the construction of the Proposed Development including steel, concrete, aggregate and asphalt. No significant effects are expected from the consumption of these materials.

7.14.3 During construction, there will be waste arisings as a result of excavation for the Proposed Development and during construction of the Proposed Development. The volume of waste will primarily be minimised by recovering waste (e.g. slag) and using this in the creation of the Proposed Development platform. Where waste cannot be re-used, a worst case volume of hazardous waste generated from excavation which may be sent to landfill has been conservatively calculated. This would result in a moderate adverse significant effect on hazardous landfill capacity. However, the significance of this effect is likely to be lower, as the volume of waste excavated and sent to landfill is likely to be lower. No other significant effects have been predicted.

Effects During Operation

7.14.4 During operation, operational waste may be created from site offices and from the Hydrogen Production Facility, which may include hazardous waste. Volumes of waste during operation have been estimated based on similar developments and no significant effects have been predicted.

Effects During Decommissioning

7.14.5 With a Decommissioning Environmental Management Plan in place, impacts are considered to be the same as those during construction and no significant effects are expected.

Summary

7.14.6 In summary, a significant adverse effect is predicted during construction due to the volumes of hazardous waste being sent to landfill, and the subsequent knock-on impact this has on hazardous waste landfill capacity. No other significant effects have been predicted for construction, operation or decommissioning of the Proposed Development.

7.15 Human Health

Introduction

7.15.1 Chapter 22: Human Health (ES Volume I, EN070009/APP/6.2) has reviewed information on population demographics, health, healthcare facilities, and social infrastructure, as well as the findings of other environmental assessments to identify areas where different types of impacts are likely to occur. This has established that the health and wellbeing of local residents could potentially be affected by the Proposed Development without further mitigations being put in place.

Construction Assessment

7.15.2 Adverse impacts that could arise due to reduced access to open spaces such as closures of Public Rights of Way and loss of woodland at Cowpen Bewley Woodland Park. However, with the implementation of measures identified in the Framework CEMP such as temporary diversion of footpaths and the development of replacement land with planting and public access to compensate for the loss of

woodland at Cowpen Bewley Woodland Park, no significant adverse effects have been identified.

7.15.3 The Proposed Development is expected to bring economic benefits to the area through employment, training and education to the local area which has suffered as a result of recent industrial closures. There would be a significant benefit from the new employment and income as a result of the Proposed Development.

Operation Assessment

7.15.4 Through compliance with the Environmental Permit and other relevant regulations, and by operating in line with other appropriate standards, the assessment of impacts has identified no significant effects on any of the factors relating to health and wellbeing.

Effects During Decommissioning

7.15.5 With a Decommissioning Environmental Management Plan in place, impacts are considered to be similar to those during construction on a short term basis.

Summary

7.15.6 In summary, a beneficial effect due to the employment benefits associated with the construction and decommissioning of the Proposed Development is predicted. No other significant effects are predicted.

7.16 Cumulative and Combined Effects

7.16.1 The purpose of Chapter 23: Cumulative and Combined Effects (ES Volume I, EN070009/APP/6.2) is to provide an assessment of the likelihood for the Proposed Development to cause combined effects or cumulative effects with other committed developments being built and operated at the same time.

7.16.2 The potential for cumulative effects during construction and operation with these other developments has been considered for all of the environmental topics by way of a review of information available within the public domain.

7.16.3 Alongside the Proposed Development, the Applicant is also promoting two other developments on Teesside (Net Zero Teesside and HyGreen). To consider the cumulative socio-economic effects of the Applicant's three developments in more detail, a socio-economic cumulative assessment has been undertaken.

Effects During Construction and Operation

7.16.4 The likely significant cumulative effects (after mitigation has been applied) during the construction and operational phase are summarised in Table 8-1.

7.16.5 For environmental topics not listed in Table 8-1, no likely significant effects were identified within the cumulative effects assessment.

Combined Effects

Introduction

7.16.6 Each environmental topic's assessment identifies effects which may occur as a result of the Proposed Development. Multiple effects on one or more common receptors could theoretically interact or combine, to result in a combined effect which is more or less significant than the effects individually.

7.16.7 Some of the environmental topic's assessments already consider combined effects on individual receptors. The combined effects assessment only considers the potential combined effects on human receptors.

7.16.8 No effects are predicted for the decommissioning stage as at this stage it is impossible to predict the environmental baseline at that time.

Effects During Construction

7.16.9 One potential receptor group is identified for construction, which includes residential receptors located around Grangetown and Middlesbrough. Potential combined effects are on traffic related noise and traffic related air quality; however the air quality assessment predicted negligible effects related to traffic air quality, and therefore there is no ability for the two effects to combine into a worse effect.

Effects During Operation

7.16.10 Four potential receptor groups were identified for operation, these are recreational receptors near to Redcar and South Gare Breakwater, recreational receptors located at Cleveland Golf Links and England Coast Path, the residential property Marsh House Farm in Redcar and the residential properties located on Broadway West in Redcar. All of the receptor groups were identified for their potential for combined effects between air quality and either visual or noise effects. However, due to the air quality assessment returning negligible effects for all receptors in operation, there is no potential for any two effects to combine into a worse effect.

Summary of Combined Effects

7.16.11 No significant combined effects have been identified.

8.0 SUMMARY AND CONCLUSIONS

8.1.1 The ES presents the findings of the EIA process that has been undertaken for the Proposed Development which are summarised in this NTS.

8.1.2 A number of environmental impact avoidance, design and mitigation measures have been identified to mitigate and control environmental effects during construction and operation of the Proposed Development. These will be secured through appropriate requirements within the DCO for the Proposed Development. Additional controls will be applied through other legislative requirements including an Environmental Permit and a regulated by the HSE under COMAH for the operation of the Proposed Development.

8.1.3 Following assessment of a comprehensive range of environmental topics as agreed through the EIA Scoping and wider consultation process the following residual significant effects (adverse and beneficial) (i.e. effects after implementation of mitigation where mitigation measures are proposed) have been identified in Table 8-1 below:

Table 8-1: Summary of Likely Significant Effects

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
Ecology and Nature Conservation (including aquatic ecology)	Construction	Direct loss of woodland habitat within Cowpen Bewley Local Wildlife Site / Local Nature Reserve over the medium term. The Framework CEMP provides measures to prevent and control damage to retained woodland due to soil impacts or pollution during construction. Retained woodland will be protected in accordance with national standards.	**Moderate Adverse (Significant)**	Where possible habitat lost will be reinstated post construction as detailed within the Outline LBMP. Compensatory woodland planting will be provided in the Replacement Land. Woodland loss with Cowpen Bewley Woodland Park Local Wildlife Site cannot be avoided. This land is required because it provides a connection to the National Gas Network through their already existing Natural Gas Above Ground Installation infrastructure.	**Moderate Adverse (Significant)**
Ecology and Nature Conservation (including aquatic ecology)	Construction	Direct loss of swamp habitat over the medium term.	**Moderate Adverse (Significant)**	Areas of swamp will be avoided where possible. Where habitats cannot be avoided, such as North of Greatham Creek and at Cowpen Bewley Woodland	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		The Framework CEMP provides measures to prevent and control pollution during construction.		Park, they will be reinstated post construction. The Final CEMP(s) will detail measures to prevent and control pollution during construction.	
Landscape and Visual Amenity	Construction and decommissioning	Visual impact on recreational users at viewpoint 7 (England Coast Path) during construction and decommissioning activities.	**Moderate Adverse (Significant)**	None proposed as no extra mitigation can be provided beyond the siting and design of the Proposed Development.	**Moderate Adverse (Significant)**
Landscape and Visual Amenity	Construction and decommissioning	Visual impact on recreational users at viewpoint 8 (Redcar seafront) during construction and decommissioning activities.	**Moderate Adverse (Significant)**	None proposed as no extra mitigation can be provided beyond the siting and design of the Proposed Development.	**Moderate Adverse (Significant)**
Landscape and Visual Amenity	Operation	Visual impact on recreational users at viewpoint 7 (England Coast Path) during operation.	**Moderate Adverse (Significant)**	None proposed as no extra mitigation can be provided beyond the siting and design of the Proposed Development.	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
Socio-economics and Land Use	Construction	Provision of employment, with a net minimum of 780 jobs as a result of the Proposed Development	**Moderate Beneficial (Significant)**	None required as this is a beneficial effect of the Proposed Development.	**Moderate Beneficial (Significant)**
Climate Change	Operation	The production of Hydrogen will enable the transition to a lower carbon economy and a predicted reduction of 39.9 MtCO2e of carbon dioxide.	**Beneficial (Significant)**	None required as this is a beneficial effect of the Proposed Development.	**Beneficial (Significant)**
Materials and Waste	Construction	Potential for the volume of hazardous waste generated by excavation during construction to be very high.	**Moderate Adverse (Significant)**	No additional mitigation measures are proposed at this time. However, the hazardous excavated material volume estimates will be further refined following a site investigation undertaken post DCO consent, pursuant to a DCO Requirement.	**Moderate Adverse (Significant)**
Human Health	Construction and decommissioning	Providing local employment, with a net minimum of 780 per year during construction and decommissioning. This will provide	**Moderate Beneficial (Significant)**	None required as this is a beneficial effect of the Proposed Development.	**Moderate Beneficial (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		an increase in local income and employment opportunities.			
Cumulative and Combined Effects	Construction	There is the potential for interaction with the Greatham North East Flood Alleviation Scheme. The site for that scheme overlaps with the Proposed Development Site, meaning there is potential for significant adverse effects on designated ecological sites, habitats and the protected species Great Crested Newt.	**Major Adverse (Significant)**	None proposed as no appropriate mitigation is available. This is due to the mitigation for the Other Development not yet being secured.	**Major Adverse (Significant)**
Cumulative and Combined Effects	Construction	The construction of multiple projects has the potential to see the loss of open mosaic habitats and grassland which is suitable for invertebrates.	**Moderate Adverse (Significant)**	None proposed as no appropriate mitigation is available. This is due to the mitigation for the Other Developments not yet being secured.	**Moderate Adverse (Significant)**
Cumulative and Combined Effects	Construction	An effect on visual amenity has been identified at during the construction stage Viewpoint 7 (England Coast Path, Warrenby).	**Moderate Adverse (Significant)**	None proposed as no appropriate mitigation is available.	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		These effects are caused by the construction activities of multiple developments occurring at the same time. The impact at both viewpoints is expected to be short-term and reversible, as it is related to construction activities.			
Cumulative and Combined Effects	Construction	An impact on visual amenity has been identified during the construction stage at Viewpoint 8 (Redcar Seafront). These effects are caused by the construction activities of multiple developments occurring at the same time. The impact at both viewpoints is expected to be short-term and reversible, as it is related to construction activities.	**Moderate Adverse (Significant)**	There is no appropriate mitigation available for this effect and therefore no mitigation is proposed.	**Moderate Adverse (Significant)**
Cumulative and Combined Effects	Construction	A beneficial impact on the local construction employment sector has been identified. With the number of construction projects expected to occur, there will be	**Major Beneficial (Significant)**	None required as this is a beneficial effect of the Proposed Development.	**Major Beneficial (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		significant job creation in the construction sector.			
Cumulative and Combined Effects	Construction	A short-term risk of a temporary accommodation shortage as a result of the cumulative employment impact has been identified, especially if most or all of the cumulative schemes' construction phases take place simultaneously. This is only a temporary effect as it will end following construction.	**Moderate Adverse (Significant)**	The Applicant is committed to working across bp projects with the promoters of other cumulative schemes to mitigate and reduce the effect of the cumulative construction workforce as far as possible. This includes setting up a working group for the Proposed Development and other cumulative developments and the local planning authorities in order to communicate and coordinate construction works at the individual developments in order to reduce any issues created by the additional construction workforce in the vicinity of the respective cumulative developments. This	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
				is secured via the Framework CEMP.	
Cumulative and Combined Effects	Construction	An impact has been identified during the construction phase due to the increase in construction workers being brought in from outside of the local area, demographic effects / community disruption is predicted to occur. The increase in construction workers could place increased demand on community facilities and their respective activities, and it is likely that the impact will be felt by local residents during the temporary construction period. To accommodate this, it is likely that local services and infrastructure will need to be expanded to accommodate the additional	**Moderate Adverse (Significant)**	The Applicant is committed to working across bp projects with the promoters of other cumulative schemes to mitigate and reduce the effect of the cumulative construction workforce as far as possible. This includes setting up a working group for the Proposed Development and other cumulative developments and the local planning authorities in order to communicate and coordinate construction works at the individual developments in order to reduce any issues created by the additional construction workforce in the vicinity of the respective	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		construction workforce from these projects.		cumulative developments. This is secured via the Framework CEMP.	
Cumulative and Combined Effects	Construction	The construction phases overlap for the Proposed Development and HyGreen, this will lead to minor disruption for business and residents.	**Moderate Adverse (Significant)**	The Applicant is committed to working across bp projects with the promoters of other cumulative schemes to mitigate and reduce the effect of the cumulative construction workforce as far as possible. This includes setting up a working group for the Proposed Development and other cumulative developments and the local planning authorities in order to communicate and coordinate construction works at the individual developments in order to reduce any issues created by the additional construction workforce in the	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
				vicinity of the respective cumulative developments. This is secured via the Framework CEMP.	
Cumulative and Combined Effects	Construction	A beneficial impact on employment and income has been identified for the construction phase of the Proposed Development. With the number of construction projects expected to occur, there will be significant job creation in the construction sector.	**Major Beneficial (Significant)**	None required as this is a beneficial effect of the Proposed Development.	**Major Beneficial (Significant)**
Cumulative and Combined Effects	Construction	A short-term risk of a temporary accommodation shortage as a result of the construction employment has been identified for the construction phase of the Proposed Development, especially if most or all of the cumulative schemes' construction phases take	**Moderate Adverse (Significant)**	The Applicant is committed to working across bp projects with the promoters of other cumulative schemes to mitigate and reduce the effect of the cumulative construction workforce as far as possible. This includes setting up a	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		place simultaneously. This is only a temporary effect as it will cease following construction.		working group for the Proposed Development and other cumulative developments and the local planning authorities in order to communicate and coordinate construction works at the individual developments in order to reduce any issues created by the additional construction workforce in the vicinity of the respective cumulative developments. This is secured via the Framework CEMP.	
Cumulative and Combined Effects	Construction	An impact on health and social care services has been identified during the construction phase of the Proposed Development. Due to the increase in the number of people in the area if the construction of multiple developments including the	**Moderate Adverse (Significant)**	The Applicant is committed to working across bp projects with the promoters of other cumulative schemes to mitigate and reduce the effect of the cumulative construction workforce as far as possible. This includes setting up a	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		Proposed Development occur at the same time, there could be an increase in the number of people who require access to health and social care services.		working group for the Proposed Development and other cumulative developments and the local planning authorities in order to communicate and coordinate construction works at the individual developments in order to reduce any issues created by the additional construction workforce in the vicinity of the respective cumulative developments. This is secured via the Framework CEMP.	
Cumulative and Combined Effects	Operation	An impact on visual amenity has been identified during the operation stage at Viewpoint 7 (England Coast Path, Warrenby). This effect is caused by the impact of the Proposed Development and	**Moderate Adverse (Significant)**	None proposed as no appropriate mitigation is available.	**Moderate Adverse (Significant)**

ENVIRONMENTAL TOPIC	DEVELOPMENT STAGE (CONSTRUCTION / OPERATION / DECOMMISSIONING)	ENVIRONMENTAL IMPACT (FOLLOWING DEVELOPMENT DESIGN AND IMPACT AVOIDANCE MEASURES)	CLASSIFICATION OF EFFECT BEFORE MITIGATION	MITIGATION IDENTIFIED	CLASSICATION OF EFFECT AFTER MITIGATION
		the other developments on the view from Viewpoint 7.			