H2Teesside Project

Preliminary Environmental Information Report

Volume III – Appendices

Appendix 12A: Report to inform Habitats Regulations Assessment Screening

Conservation of Habitats and Species Regulations 2017 (as amended)

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

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1.0 INTRODUCTION

1.1 Overview

1.1.1 This report to inform Habitats Regulations Assessment (HRA) Screening has been prepared on behalf of bp (the Applicant). It will ultimately form part of the application (the 'Application') for a Development Consent Order ('DCO'), that will be submitted to the Secretary of State for Energy Security and Net Zero, under Section 37 of the Planning Act 2008.

1.1.2 The applicant is seeking development consent for the construction, operation and decommissioning of an approximately 1.2-Gigawatt Thermal (GWth) Hydrogen Production Facility with associated Carbon Capture and Storage (CCS) and hydrogen transport pipeline network on land in Redcar and Cleveland, Stockton-on-Tees, and Hartlepool on Teesside (hereafter referred to as the 'Proposed Development Site') (see Figure 1-1: Proposed Development Site).

1.1.3 A DCO is required for the Proposed Development as the Proposed Development has been brought into the Planning Act 2008 regime through a Section 35 Direction.

1.2 The Proposed Development

1.2.1 The Main Site, which comprises the Production Facility together with the associated carbon capture and compression facilities and ancillary infrastructure, will be located at 'The Foundry', within the Teesworks development site. Carbon dioxide (CO_2) captured from the process will be compressed at the Main Site and will be transported for geological storage offsite using Northern Endurance Partnership (NEP) infrastructure.

1.2.2 The Hydrogen Pipeline Corridor will connect the Main Site to off-takers at various industrial installations across the Tees Valley. A Natural Gas Connection Corridor will connect the Production Facility to gas transmission infrastructure and an electrical connection corridor will connect the Production Facility to the National Grid Network.

1.2.3 Connections are required for water supply and discharge at the Production Facility. The preferred option for effluent discharge at this stage is a connection to Bran Sands, Wastewater Treatment Works (WwTW), for the provision of water (either raw water or treated effluent) for the use in the operation of the Production Facility and discharge of effluent from the Main Site back to Bran Sands WwTW for treatment. Other options being considered within the Water Connections Corridor include onsite water treatment (at the Main Site) prior to return of treated effluent back to Bran Sands WwTW as well as a demineralised water (DMW) connection between the Main Site and Wilton International.

1.2.4 Further information regarding the Project is provided in Chapter 4: Proposed Development (PEIR Report, Volume I).

1.3 Legislative Context

1.3.1 The Conservation of Habitats and Species Regulations 2017, hereafter referred to as the 'Habitats Regulations' provide for the designation of sites for the protection of certain species and habitats. These are collectively termed 'European sites' and form part of a network of protected sites across the UK known as the 'national site network' (NSN). For ease of expression, this report uses the term 'European site' for both European sites and European offshore marine sites. European sites protected by the Habitats Regulations include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). Additionally, it is a matter of UK Government policy and guidance that the following sites should also be subject to a HRA, where affected by a plan or project: proposed SACs; potential SPAs; and Ramsar sites (both proposed and listed); and areas secured as sites compensating for damage to a European site.

1.3.2 Under the Habitats Regulations, a Competent Authority must consider whether a development will have a likely significant effect (LSE) on a European site, either alone or in combination with other plans or projects. Where LSE are likely and a project is not directly connected with or necessary to the management of that site(s), an appropriate assessment (AA) is required of the implications of the plan or project for that site(s) in view of its conservation objectives.

1.3.3 Further to this, where an AA has been carried out and results in a negative assessment (i.e. where Adverse Effects on Integrity (AEoI) of European site(s) cannot be ruled out, despite any proposed avoidance or reduction (mitigation) measures), consent can only be granted if: there are no alternative solutions; there are Imperative Reasons of Overriding Public Interest (IROPI); and Compensatory Measures have been secured. These latter stages are known as the 'derogations.'

1.3.4 HRA is a multi-stage process which identifies LSE, assesses any AEoI of a European site, and considers the derogations (as appropriate). The joint Defra, Welsh Government, Natural England and Natural Resources Wales guidance (2021) 'Habitats regulations assessments: protecting a European site' (hereafter referred to as the 'joint guidance') identifies a three-stage process, as set out below. It may not be necessary to complete all stages, depending on what conclusion is reached at each stage. The stages are:

- Stage 1. Screening – check if the proposal is likely to have a significant effect on the European site(s)'s conservation objectives, both alone or in combination with other plans or projects. At this stage, and in accordance with case law (People Over Wind and Sweetman v Coillte Teoranta (Case C-323/17)), mitigation measures proposed for the purpose of avoiding or minimising risk to a European site should not be taken into account. If a conclusion of no LSE is reached for all European sites and their qualifying features considered, it is not necessary to proceed to the next stages of HRA.
- Stage 2. Appropriate assessment (AA) – assess the implications of the proposal for the qualifying features of the European site(s), in view of the site(s)' conservation objectives and identify ways to avoid or minimise any effects.

- Stage 3. Derogation – consider if proposals that would have an AEoI of a European site(s) qualify for an exemption. There are three tests to this stage to be followed in order: consider alternative solutions; consider IROPI; and secure compensatory measures. Each test must be passed in sequence for a derogation to be granted.

1.3.5 When submitted with the DCO application, this will be a technical report to inform and support the competent authority (the Secretary of State) in its decision making.

1.3.6 The United Kingdom (UK) left the European Union (EU) on 31 January 2020 under the terms set out in the EU (Withdrawal Agreement) Act 2020 ("the Withdrawal Act"). The Withdrawal Act retains the body of existing EU-derived law within our domestic law, and this include the provisions of the Habitats Directive from which the requirement for HRA arises. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 maintains the existing protections for habitats and species.

2.0 METHOD

2.1 Introduction

2.1.1 This report has been prepared with reference to the general European Commission guidance on HRA (European Commission, 2001), general guidance on HRA published by the UK government in 2021 (Ministry of Housing, Communities & Local Government, 2021) and Planning Inspectorate (the Inspectorate) Advice Note 10 (The Planning Inspectorate, 2022).

2.1.2 The assessment of LSEs takes account of relevant EU case law (for instance, the Holohan and People over Wind cases, discussed below).

2.1.3 Figure 2-1 below outlines the stages of HRA. **Note that while Figure 2-1 shows all the stages of the HRA process, this document only discusses Stage 1 in detail (see below). The Stage 2 Report to Inform Appropriate Assessment will be documented and submitted with the Environmental Statement. The DCO application may also be accompanied by a revised version of this report if further evidence emerges which enables any of the conclusions over Likely Significant Effects to be revised.**

2.1.4 Whilst the HRA decisions must be taken by the competent authority (The Inspectorate as Examining Authority advising the Secretary of State as competent authority), the information needed to undertake the necessary assessments must be provided by the Applicant. The information needed for the competent authority to establish whether there are any LSEs from the Proposed Development is therefore provided in this Report.

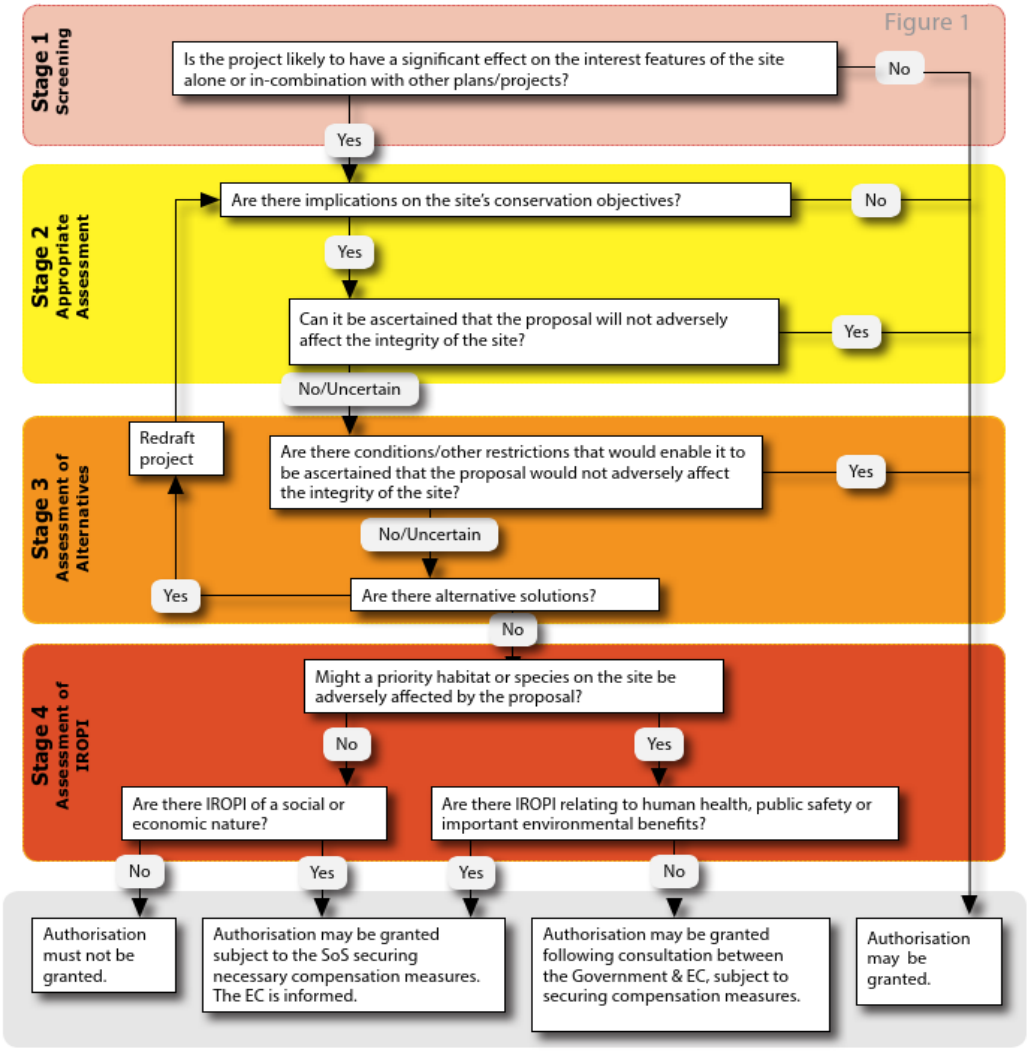

Figure 2-1: Four stage approach to Habitats Regulations Assessment of Projects

HRA Stage 1 – Screening for LSEs

2.1.5 The objective of the LSE test is to 'screen out' those aspects of a project and / or the European sites that can, without any detailed appraisal, be said to be unlikely to result in significant adverse effects upon European sites, usually because there is no mechanism for an adverse interaction (i.e., a pathway) with European sites. The remaining aspects are then taken forward to Stage 2 of the HRA Process - Appropriate Assessment. The assessment must consider the potential for effects 'in combination' with other plans and projects.

2.1.6 This report has been prepared having regard to all relevant case law relating to the 2017 Regulations, the Habitats Directive and Birds Directive. This includes the ruling by the Court of Justice of the European Union (CJEU) in the case of People Over Wind, Peter Sweetman v Coillte Teoranta (C-323/17).

2.1.7 This case held that; "it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site" (paragraph 40). This establishes that 'mitigation measures' cannot be taken into account at the HRA Stage 1 (screening), but they can be taken into account

at HRA Stage 2 - Appropriate Assessment. However, it is important to note that not all mitigation measures are excluded from consideration – only those "intended to avoid or reduce the harmful effects of the… project on that site". Mitigation measures which are, for example, intended to avoid effects on a local watercourse outside the European site designated boundary but which outfalls into the European designated site, can be taken into account as the benefit conveyed to the European site is coincidental and the measures would be delivered as part of good practice even if no European sites were present.

2.1.8 This represents a deviation from the approach usually adopted in the Ecological Impact Assessment (EcIA), which considers embedded mitigation (even those measures that are included to directly avoid or reduce harmful effects on a European designated site) to form a part of the Proposed Development and takes these measures into account when assessing the potential impacts on qualifying habitats and species.

2.1.9 Where mitigation measures are mentioned in this report and taken into account at the screening stage, they are therefore ones which may reduce or avoid harmful effects on certain (local) habitats or species but are not relied on to directly avoid or reduce harmful effects on the qualifying features of the European designated sites. This includes standard best practice mitigation measures incorporated into the Construction Environmental Management Plan (CEMP) such as surface water drainage attenuation.

HRA Stage 2 – Appropriate Assessment

2.1.10 Where it is determined that a conclusion of 'no Likely Significant Effect' cannot be drawn, the HRA assessment proceeds to the next stage of HRA known as Appropriate Assessment. Case law has clarified that 'Appropriate Assessment' is not a technical term. In other words, there are no specific technical analyses, or level of detail, that are classified by law as belonging to Appropriate Assessment rather than the screening for LSE. The Appropriate Assessment constitutes whatever level of further assessment is required to determine whether an adverse effect on integrity would arise.

2.1.11 By virtue of the fact that it follows the screening process, there is an understanding that the analysis will be more detailed than that undertaken at the previous stage. One of the key considerations during Appropriate Assessment is whether there is available mitigation that would address the potential effect, allowing for a conclusion of no adverse effect on integrity. In practice, the Appropriate Assessment takes any element of the Proposed Development that could not be excluded as having LSE following HRA Stage 1 and assesses the potential for an effect in more detail, with a view to concluding whether there would be an adverse effect on site integrity. Adverse effects on site integrity include disruption of the coherent structure and function of the European site(s) and the ability of the site to achieve its conservation objectives.

2.1.12 In 2018 the Holohan ruling was handed down by the European Court of Justice. Among other provisions paragraph 39 of the ruling states that *'As regards other*

habitat types or species, which are present on the site, but for which that site has not been listed, and with respect to habitat types and species located outside that site, … typical habitats or species must be included in the appropriate assessment, if they are necessary to the conservation of the habitat types and species listed for the protected area' [emphasis added]. This ruling has been considered in relation to the Proposed Development and European sites that are linked to the proposal via an impact pathway. For example, the Southern North Sea SAC is designated for harbour porpoise, which range vast distances beyond the designated site boundary. Harbour porpoise *Phocoena phocoena* are known to regularly forage within the lower stretches of the River Tees and potential impacts of the Proposed Development on habitat use in the lower Tees require assessment.

The Rochdale Envelope

2.1.13 In July 2018, the Inspectorate published Advice Note Nine: Rochdale Envelope (The Planning Inspectorate, 2018), explaining how the principles of the Rochdale Envelope should be used by planning applications for the Environmental Impact Assessment (EIA) process.

2.1.14 The Rochdale Envelope[1] is applicable where some of the details of a Proposed Development cannot be confirmed when an application is submitted, and flexibility is needed to address uncertainty. Notwithstanding, all significant potential effects of a Proposed Development must be properly addressed.

2.1.15 It encompasses three key principles:

- The assessment should use a cautious worst-case approach;
- The level of information assessed should be sufficient to enable the Likely Significant Effects of a Proposed Development to be assessed; and
- The allowance for flexibility should not be abused to provide inadequate descriptions of projects.

2.1.16 This HRA has given due consideration to the Rochdale Envelope. The worst-case (i.e., the potentially most impactful) construction/decommissioning and operational scenarios have been assessed in relation to impact pathways.

Nutrient Neutrality

2.1.17 Natural England has issued advice highlighting the need to consider the LSEs of nutrients on internationally designated sites (Natural England, 2022). Development plans can be considered 'nutrient neutral' where they can demonstrate that they will cause no overall increase in nutrient pollution affecting specified European sites. This has been considered in the compiling of this report.

In Combination Effects

2.1.18 It is a requirement of Regulation 63(a) of the 2017 Regulations to not only assess the impacts of a development project alone, but also to investigate whether there is a potential for in-combination effects with other projects or plans. In practice, such in-

[1] The Rochdale Envelope arises from two cases: R. v Rochdale MBC ex parte Milne (No.1) and R. v Rochdale MBC ex parte Tew [1999], which are cases that dealt with outline planning applications for a proposed business park in Rochdale.

combination assessment is of greatest relevance when an impact pathway relating to a project would otherwise be screened out – not because it is not present – but because its individual contribution is considered not to result in LSEs.

2.1.19 For the purposes of this HRA, several plans, projects and strategies proposing/ aiming for development have been identified, which may act in-combination with the Proposed Development. These are set out in Chapter 5 of this report.

2.1.20 Paragraph 4.9 of the Inspectorate Advice Note Ten requires an evaluation of the potential for the Project to require other consents which could also require HRA by different competent authorities, and a statement as to whether the Scheme boundary overlaps with devolved administrations or other European Economic Area (EEA) States.

3.0 BASELINE EVIDENCE GATHERING

3.1 Scope of the Project

3.1.1 There is no guidance that dictates the general physical scope of an HRA of a Project. Therefore, in considering the physical scope of the assessment, we were guided primarily by the identified impact pathways (called the source-pathway-receptor model).

3.1.2 Briefly defined, impact pathways are routes by which the implementation of a project can lead to an effect upon a European designated site. An example of this would be visual and noise disturbance arising from the construction/decommissioning work or operational phase associated with a project.

3.1.3 If there are sensitive ecological receptors within a nearby European site (e.g., non-breeding overwintering birds), this could alter their foraging and roosting behaviour and potentially affect the site's integrity. For some impact pathways (notably air pollution) there is guidance that sets out distance-based zones required for assessment. For others, a professional judgment must be made based on the best available evidence.

3.2 Relevant European Sites

3.2.1 Guidance published by the Environment Agency (Environment Agency, 2016) recommends that for large power generation developments greater than 50 MW, a radius of search of 15 km should be used when identifying relevant European designated sites which may be affected by the development. The Proposed Development is a 1.2 GWth Hydrogen Production Facility and as such, a Zone of Influence of 15 km (minimum) has been used.

3.2.2 Table 3-1 presents the European sites (as shown on Figure 3-1: European Designated Sites Screened into the Assessment of LSE within 15 km) identified within a 15 km radius of the Proposed Development.

Table 3-1: European designated sites within 15 km of the Proposed Development Site

SITE NAME	PROXIMITY TO MAIN SITE (APPROX)	PROXIMITY TO CONNECTION CORRIDORS
Teesmouth and Cleveland Coast Special Protection Area (SPA)	10 m north	Adjacent to/overlapping
The Teesmouth and Cleveland Coast Ramsar	173 m at closest point	Adjacent to/overlapping
North York Moors Special Area of Conservation (SAC)	12.1 km south-east	8.0 km south-east
North York Moors SPA	12.1 km south-east	8.0 km south-east

SITE NAME	PROXIMITY TO MAIN SITE (APPROX)	PROXIMITY TO CONNECTION CORRIDORS
Durham Coast SAC	13.7 km north-west	11.0 km north-west
Northumbria Coast SPA	13.7 km north	11.0 north
Northumbria Coast Ramsar	13.7 km north-west	11.0 km north
Castle Eden Dene SAC	Over 15 km	14.3 km north-west

3.2.3 The North York Moors SAC / SPA, Northumbria Coast SPA / Ramsar and Castle Eden Dene SAC are considered in the context of operational stack emissions from the Proposed Development, which have the potential to affect European sites that lie relatively far from industrial developments.

3.2.4 In addition to the above listed sites, Table 13-2 presents European designated sites list marine mammals or migratory fish as qualifying species which range great distances and are therefore screened into the assessment of LSE.

Table 3-2: European sites >15 km from the proposed development which support qualifying features which could be affected.

SITE NAME	DISTANCE AND DIRECTION FROM SITE (AT CLOSEST POINT)
Berwickshire and North Northumberland Coast SAC	87.72 km north
Humber Estuary SAC	106.38 km south
Southern North Sea SAC	101.34 km east
River Tweed SAC	107.27 km north
Tweed Estuary SAC	135.95 km north
The Wash and North Norfolk Coast SAC	187.05 km south

3.2.5 Although Ramsar sites are not explicitly covered by the Conservation of Habitats and Species Regulations (2017), paragraph 176 of the National Planning Policy Framework (NPPF) in England extends Ramsar sites the same level of protection as SPAs and SACs. Therefore, the Teesmouth and Cleveland Coast Ramsar and the Northumbria Coast Ramsar are considered in this assessment.

Summary of Designated Sites and Qualifying Features

3.2.6 An introduction to the designated sites listed within Tables 3-1 and 3-2 above, and a summary of the qualifying features, conservation objectives and threats / pressures to site integrity is provided in the following sections.

Teesmouth and Cleveland Coast SPA

Introduction

3.2.7 The Teesmouth and Cleveland Coast SPA, originally classified in 1995, is an estuarine and coastal site located on the north-eastern coast of England of approximately 12,210.62 ha. It comprises a range of coastal habitats, such as sand and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes. The SPA / Ramsar lies along a stretch of coast that has been significantly modified by human activity. The site provides feeding and roosting opportunities for a significant number of waterfowl in winter and the passage period. Furthermore, little tern *Sterna albifrons* breed on beaches within the site during summer and sandwich tern *Sterna sandvicensis* use the SPA / Ramsar as a stop-over location on passage.

3.2.8 The SPA was extended in January 2020 to add breeding avocet *Recurvirostra avosetta*, breeding common tern *Sterna hirundo* and non-breeding ruff *Calidris pugnax* as protected features. The extension also included additional areas of coastal and wetland habitats, the River Tees channel and the shallow coastal waters of Tees Bay.

SPA Qualifying Features

3.2.9 The site qualifies as a SPA under Article 4 of the Birds Directive (2009/147/EC) by supporting populations of the following features (Natural England, 2020a):

- Pied avocet *Recurvirostra avosetta* (breeding);
- Red knot *Calidris canutus* (non-breeding);
- Ruff *Calidris pugnax* (non-breeding);
- Common redshank *Tringa totanus* (non-breeding);
- Sandwich tern *Sterna sandvicensis* (non-breeding);
- Common tern *Sterna hirundo* (breeding);
- Little tern *Sterna albifrons* (breeding); and,
- Waterbird assemblage.

Conservation Objectives

3.2.10 The conservation objectives for the Teesmouth and Cleveland Coast SPA are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:*

- *the extent and distribution of the habitats of the qualifying features;*
- *the structure and function of the habitats of the qualifying features;*
- *the supporting processes on which the habitats of the qualifying features rely;*
- *the population of each of the qualifying features; and,*

- *the distribution of the qualifying features within the site"* (Natural England, 2020b).

Threats and Pressures

3.2.11 The following threats / pressures to the site integrity of the Teesmouth and Cleveland Coast SPA have been identified in Natural England's Site Improvement Plan (Natural England, 2014a):

- Physical modification
- Public access / disturbance
- Direct land take from development
- Water pollution
- Fisheries: Commercial marine and estuarine
- Fisheries: Recreational marine and estuarine
- Undergrazing
- Inappropriate water levels
- Predation
- Coastal squeeze
- Change to site conditions
- Air pollution: Impact of atmospheric nitrogen deposition.

Teesmouth and Cleveland Coast Ramsar

Introduction

3.2.12 The Teesmouth and Cleveland Coast Ramsar site is a wetland of international importance, comprising intertidal sand and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes. The boundaries of the Teesmouth and Cleveland Coast Ramsar overlap with the Teesmouth and Cleveland Coast SPA. The Ramsar site was extended in 2020 to include additional terrestrial areas within the Tees estuary and along the foreshore to the north and south because of the site's international importance for waterbirds.

Qualifying Features

3.2.13 The site qualifies as a Ramsar for the following Ramsar criteria (Natural England, 2020c):

- Criterion 5 - Assemblages of international importance
  - Species with peak counts in winter
    - 26,786 waterfowl (5-year peak mean 2011/12-2015/16)
- Criterion 6 - Species/populations occurring at levels of international importance
  - Qualifying Species/populations (as identified at designation)

- Species with peak counts in spring / autumn:
- Common redshank *Tringa totanus*; 1,648 individuals representing an average of 1.1% of the East Atlantic population (1987-91)

– Species with peak counts in winter:

- Red knot *Calidris canutus islandica*; 5,509 individuals representing an average of 1.6% of the NE Canada/Greenland/Iceland/UK population (5-year peak mean 1991/92-1995/96)
- Sandwich tern *Thalasseus sandvicensis*; 1,900 individuals representing an average of 4.3% of the GB population (1988-1992)

3.2.14 The threats and pressures to the Teesmouth and Cleveland Coast Ramsar are considered to be the same as for the Teesmouth and Cleveland Coast SPA (refer to paragraph 3.3.7 above).

North York Moors SAC

Introduction

3.2.15 The North York Moors SAC is a 44,053.29 ha in size and is a large site that comprises a variety of habitats, most notably heath and scrub (73%), dry grassland (15%), and bogs and marshes (4%). The site lies in north-east Yorkshire within the North York Moors National Park and contains the largest contiguous area of upland heather moorland in England.

3.2.16 Half the site is covered by dry heath, which forms the main vegetation type on the western, southern and central moors. Wet heath is the second most dominant habitat that is found in the eastern and northern moors, where the soil is not as free-draining. Together the heathland components are the primary reason for qualifying the SAC.

3.2.17 Blanket bog is also a qualifying feature, which occurs along the watersheds of some of the high moors on relatively deep peat. The blanket bog areas are managed for grouse through rotational burning and extensive sheep grazing. In recent decades bracken has become dominant in areas that used to harbour ericaceous species. The site comprises boggy flushes with rushes and mires with Sphagnum mosses and sedges. The SAC, particularly the bog elements, support populations of upland breeding bird species including merlin and golden plover (see the North York Moors SPA below).

Qualifying Features (Natural England, 2019a)

- Annex I habitats that are a primary reason for selection of this site:
  - Northern Atlantic wet heaths with *Erica tetralix*; and
  - European dry heaths
- Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:
  - Blanket bogs

Conservation Objectives (Natural England, 2018a and 2019)

3.2.18 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change; the conservation objectives are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;*

- *The extent and distribution of the qualifying natural habitats;*
- *The structure and function (including typical species) of the qualifying natural habitats; and*
- *The supporting processes on which the qualifying natural habitats rely.*"

Threats and Pressures to Site Integrity (Natural England, 2014c)

3.2.19 The following threats / pressures to the site integrity of the North York Moors SAC have been identified in Natural England's Site Improvement Plan:

- Climate change;
- Air pollution: Impact of atmospheric nitrogen deposition;
- Disease;
- Invasive species;
- Managed rotational burning;
- Planning permission: Mineral and waste;
- Game management: Grouse Moors;
- Changes in species distributions;
- Agriculture;
- Energy production;
- Wildfire / arson.

North York Moors SPA

Introduction

3.2.20 The upland moorland that represents the qualifying habitat of the North York Moors SAC (described above) also supports significant populations of upland breeding birds, in particular golden plover and merlin.

Qualifying Features (Natural England, 2019b)

- Annex II species that are a primary reason for selection of this site:
  - Merlin *Falco columbianus*; 526 pairs representing at least 2.3% of the breeding population in Great Britain (numbers are at time of designation); and

- European golden plover *Pluvialis apricaria*; 40 pairs representing at least 3.1% of the breeding population in Great Britain

Conservation Objectives (Natural England, 2019b and 2019c)

3.2.21 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change; the conservation objectives are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Birds Directive, by maintaining or restoring:*

- *The extent and distribution of the habitats of the qualifying features;*
- *The structure and function of the habitats of the qualifying features;*
- *The supporting processes on which the habitats of the qualifying features rely;*
- *The population of each of the qualifying features; and*
- *The distribution of the qualifying features within the site.*"

Threats / Pressure to Site Integrity

3.2.22 The following threats / pressures to the site integrity of the North York Moors SPA have been identified in Natural England's Site Improvement Plan (Natural England, 2014c):

- Climate change;
- Air pollution: Impact of atmospheric nitrogen deposition;
- Disease;
- Invasive species;
- Managed rotational burning;
- Planning permission: Mineral and waste;
- Game management: Grouse Moors;
- Changes in species distributions;
- Agriculture;
- Energy production; and
- Wildfire / arson.

Durham Coast SAC

Introduction

3.2.23 The Durham Coast SAC is a 389.61 ha site comprising coastal sand dunes (43%), shingle / sea cliffs (31%), marine areas (21%) and humid grassland (5%). It is the only example of a vegetated sea cliff on Magnesian Limestone in the UK, extending along the North Sea coastline for 20 km.

3.2.24 The SAC's vegetation is unique in the British Isles, consisting of a mosaic of calcareous and neutral grasslands, tall-herb fen, seepage flushes and wind-pruned scrub. These habitats harbour a wide range of species with varied ecological niches and requirements, often including rare or scarce species. The Durham Coast SAC also supports significant populations of breeding seabirds, wintering waders and rare invertebrates, such as the Durham argus *Aricia Artaxerxes salmacisi* (Natural England, 2014d).

Qualifying Features

- Annex I habitats that are a primary reason for selection of this site:
  - Vegetated sea cliffs of the Atlantic and Baltic Coasts

Conservation Objectives

3.2.25 The conservation objectives for the Durham Coast SAC are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;*

- *The extent and distribution of qualifying natural habitats*
- *The structure and function (including typical species) of qualifying natural habitats, and*
- *The supporting processes on which the qualifying natural habitats rely"* (Natural England, 2018c).

Threats and Pressures

3.2.26 The following threats / pressures to the site integrity of the Durham Coast SAC have been identified in Natural England's Site Improvement Plan (Natural England, 2014e):

- Natural changes to site conditions;
- Inappropriate coastal management;
- Invasive species;
- Fertiliser use;
- Vehicles: Illicit;
- Changes to site conditions; and
- Public access / disturbance.

3.2.27 Additional supplementary advice on conserving and restoring site features was published in 2019 and should be read together with the conservation objectives (Natural England, 2019d).

Northumbria Coast SPA / Ramsar

Introduction

3.2.28 The Northumbria Coast SPA comprises several discrete sections of rocky foreshore between the north of Northumberland and the County Durham. The site also includes an area of sandy beach. The SAC largely includes cliffs, crags / ledges, intertidal rock, open coast and pools. The site is subject to a range of recreational activities, including walking, sea angling, birdwatching and water sports.

3.2.29 The SPA was classified in 2000 for supporting internationally important populations of over-wintering purple sandpiper and turnstone, and a breeding colony of little tern at Beadnell Bay.

SPA Qualifying Features (JNCC, 2018)

3.2.30 Annex I species that are a primary reason for selection of this site:

- Arctic tern *Sterna paradisae*a; 1,549 pairs representing 2.92% of the GB population
- Little tern *Sternula albifrons*; 40 pairs representing 1.7% of the GB population

3.2.31 Annex II species that are a primary reason for selection of this site:

- Turnstone *Arenaria interpres*; 1,739 individuals representing 2.6% of the biogeographic population
- Purple sandpiper *Calidris maritima*; 787 individuals representing 1.6% of the biogeographic population

Ramsar Qualifying Features (RSIS, 2000b)

1.1.1 The site qualifies as a Ramsar for the following Ramsar criteria:

- Criterion 6 - Species/populations occurring at levels of international importance
  - Qualifying Species/populations (as identified at designation)
  - Species with peak counts in winter:
    - Purple sandpiper *Calidris maritima*; 787 individuals representing an average of 1.6% of the population (5-year peak mean for 1992/93 to 1996/97)
    - Turnstone *Arenaria interpres*; 1,739 individuals representing an average of 2.6% of the population (5 year peak mean for 1992/93 to 1996/97)
  - Species with peak counts during the breeding season:
    - Little tern *Sterna albifrons*; 40 pairs representing an average of 1.7% of the GB population (5 year mean for 1993 to 1997)

SPA Conservation Objectives (Natural England, 2019e)

3.2.32 With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

3.2.33 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Threats / Pressures to Site Integrity (Natural England, 2015b)

3.2.34 The following threats / pressures to the site integrity of the Northumbria Coast SPA have been identified in Natural England's Site Improvement Plan:

- Public access / disturbance;
- Water pollution;
- Invasive species;
- Changes in species distributions;
- Predation;
- Coastal squeeze;
- Direct impact from third party;
- Transportation and service corridors;
- Change in land management;
- Air pollution: Risk of atmospheric nitrogen deposition; and
- Fisheries: Commercial marine and estuarine.

Castle Eden Dene SAC

Introduction

3.2.35 Castle Eden Dene represents the most extensive northerly native occurrence of yew *Taxus baccata* woods in the UK. Extensive yew groves are found in association with ash-elm *Fraxinus-Ulmus* woodland, and it is the only site selected for yew woodland on magnesian limestone in north-east England.

Qualifying Features

3.2.36 Annex I habitats that are a primary reason for selection of this site:

- Yew dominated woodland.

Conservation Objectives

3.2.37 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change:

3.2.38 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats;
- The structure and function (including typical species) of qualifying natural habitats, and,
- The supporting processes on which qualifying natural habitats rely.

Threats / Pressures to Site Integrity (Natural England, 2015b)

3.2.39 The following threats / pressures to the site integrity of Castle Eden Dene SAC have been identified in Natural England's Site Improvement Plan:

- Invasive species;
- Forestry and woodland management;
- Deer, and,
- Air pollution: impact of atmospheric nitrogen deposition.

Berwickshire and North Northumberland Coast SAC

Introduction

3.2.40 The Berwickshire and North Northumberland Coast SAC is a 65,226.12ha site in north-east England comprising a variety of habitats, including marine areas / sea inlets (73.2%), tidal rivers and estuaries (13.4%), coastal sand dune (4.5%) and shingle / sea cliffs (6.7%).

3.2.41 The SAC comprises an extensive stretch of intertidal sand- and mudflats, which range from wave-exposed beaches to sheltered muddy flats. Parts of these harbour the largest intertidal beds of narrow-leaved eelgrass *Zostera angustifolia* and dwarf eelgrass *Z. noltei*. Some of the beds harbour large beds of mussels, sand-eels, small crustaceans and polychaete worms.

3.2.42 Furthermore, the SAC comprises an extensive stretch of reef coastline. The subtidal rocky reefs harbour rich marine communities. The community variety is due to the wide range of physical conditions in the area, ranging from wave-exposed locations, open coast to sheltered reefs. The Farne Islands are especially important because they are some of the few rocky islands with extensive reefs.

3.2.43 It is the most south-easterly site selected for grey seal, supporting around 2.5% of the annual UK pup production.

Qualifying Features (JNCC, 2020b)

3.2.44 Annex I habitats that are a primary reason for selection of this site:

- Mudflats and sandflats not covered by seawater at low tide;
- Large shallow inlets and bays;
- Reefs; and
- Submerged or partially submerged sea caves.

3.2.45 Annex II species that are a primary reason for selection of this site:

- Grey seal *Halichoerus grypus*

Conservation Objectives (Natural England, 2014f)

3.2.46 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change; the conservation objectives are to:

3.2.47 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

Threats / Pressures to Site Integrity (Natural England, 2015b)

3.2.48 The following threats / pressures to the site integrity of the Berwickshire and North Northumberland Coast SAC have been identified in Natural England's Site Improvement Plan:

- Public access / disturbance;
- Water pollution;
- Invasive species;
- Changes in species distribution;
- Predation;
- Coastal squeeze;
- Transportation and service corridors;

- Change in land management;
- Air pollution: Risk of atmospheric nitrogen deposition; and
- Fisheries: Commercial marine and estuarine.

Humber Estuary SAC

Introduction

3.2.49 The Humber Estuary SAC is 36,657.15 ha in size and is a large estuarine site in north-eastern England comprising a variety of habitats, including tidal rivers / estuaries (94.9%), saltmarsh (4.4%), coastal sand dunes (0.4%) and bogs / marshes (0.4%).

3.2.50 The SAC is a large macro-tidal coastal plain estuary with high suspended sediment loads. It is a dynamic system that feeds accreting and eroding intertidal and subtidal sand- and mudflats, saltmarsh and reedbeds. It also harbours a range of sand dune types, sandbanks and coastal lagoons. Salinity declines upstream, giving rise to tidal reedbeds and brackish saltmarsh communities. The SAC harbours a significant fish assemblage, including river lamprey and sea lamprey.

3.2.51 The estuary is a favoured feeding site for wintering and passage wildfowl, which forage in the different habitats of the SPA. The sandy habitats attract knot and grey plover, while waterfowl prefer the wetland zones. At high tide, mixed flocks of birds occupy key roost sites, which are under pressure due to the combined effects of land claim, coastal squeeze and habitat loss.

Qualifying Features (JNCC, 2020d)

3.2.52 Annex I habitats that are a primary reason for selection of this site:

- Estuaries; and
- Mudflats and sandflats not covered by seawater at low tide.

3.2.53 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- Sandbanks which are slightly covered by sea water all the time;
- Coastal lagoons;
- Salicornia and other annuals colonizing mud and sand;
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);
- Embryonic shifting dunes;
- Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”);
- Fixed coastal dunes with herbaceous vegetation (“grey dunes”); and
- Dune with *Hippopha rhamnoides*.

3.2.54 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Sea lamprey *Petromyzon marinus*;

- River lamprey *Lampetra fluviatilis*; and
- Grey seal *Halichoerus grypus*.

Conservation Objectives (Natural England, 2020b)

3.2.55 With regard to the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change; the conservation objectives are to:

3.2.56 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site

Threats / Pressures to Site Integrity (Natural England, 2020c)

3.2.57 The following threats / pressures to the site integrity of the Humber Estuary SAC have been identified in Natural England's Site Improvement Plan:

- Water pollution;
- Coastal squeeze;
- Changes in species distributions;
- Undergrazing;
- Invasive species;
- Natural changes to site conditions;
- Public access / disturbance;
- Fisheries: Fish stocking;
- Fisheries: Commercial marine and estuarine;
- Direct land take from development;
- Air pollution: Impact of atmospheric nitrogen deposition;
- Shooting / scaring; and
- Inappropriate scrub control.

Southern North Sea SAC

Introduction

3.2.58 The Southern North Sea SAC is a large (3,695,054 ha), offshore site comprising entirely marine habitat (100%). Its purpose is to protect the primary habitat for harbour porpoise *Phocoena phocoena*, which uses a network of habitat patches in the North Sea.

3.2.59 Harbour porpoises display seasonal differences in the relative use of marine habitats. The SAC was identified using harbour porpoise sightings data to identify areas that consistently harboured elevated densities of harbour porpoise. The SAC has been designated due to its importance for porpoise both in the summer and winter months.

Qualifying Features (JNCC, 2020e)

3.2.60 Annex II species that are a primary reason for selection of this site:

- Harbour porpoise *Phocoena phocoena*

Conservation Objectives (JNCC and Natural England, 2019e)

3.2.61 To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:

- Harbour porpoise is a viable component of the site;
- There is no significant disturbance of the species; and
- The condition of supporting habitats and processes, and the availability of prey is maintained.

Threats / Pressures to Site Integrity

3.2.62 The following threats / pressures to the site integrity of the Southern North Sea SAC have been identified based on the site's qualifying feature:

- Water pollution;
- Changes in species distributions;
- Fisheries: Commercial marine and estuarine;
- Construction of offshore and coastal infrastructure projects (e.g. wind farms, pipelines, harbours); and
- Noise disturbance.

River Tweed SAC

Introduction

3.2.63 The River Tweed SAC is the most species-rich river with *Ranunculus* in the north-eastern part of its range. It has high ecological diversity which is partly due to its diverse geological setting. Examples of its vegetation include stream water-crowfoot

Ranunculus penicillatus, fan-leaved water-crowfoot *R. circinatus* and common water-crowfoot R. aquatilis. The river is also designated for its significant assemblage of Atlantic salmon *Salmo salar*, otter *Lutra lutra*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri* and river lamprey *Lampetra fluviatilis*.

Qualifying Features (JNCC, 2020f)

3.2.64 Annex I habitats that are a primary reason for selection of this site:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

3.2.65 Annex II species that are a primary reason for selection of this site:

- Atlantic salmon; and
- Otter.

3.2.66 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Sea lamprey;
- Brook lamprey; and
- River lamprey.

Conservation Objectives (Natural England, 2014g)

3.2.67 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change; the conservation objectives are to:

3.2.68 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

Threats / Pressures to Site Integrity (Natural England, 2014h)

3.2.69 The following threats / pressures to the site integrity of the River Tweed SAC have been identified in Natural England's Site Improvement Plan:

- Water pollution;

- Invasive species;
- Physical modification; and
- Water abstraction.

Tweed Estuary SAC

Introduction

3.2.70 The Tweed Estuary SAC is a 156.24 ha European site, comprising tidal rivers / estuaries (90%) and salt marsh (10%). The SAC is a long and narrow estuary that discharges into the North Sea. Its water quality is classified as excellent throughout, supporting a wide range of habitats. These include substantial sandbanks, areas of rocky shore (at its mouth), estuarine boulders and cobbles (further upstream). The most exposed sandy shores are subject to wave action from the sea and scouring from the outflowing river. Species and habitats reflect these conditions, with diversity decreasing with increasing exposure.

3.2.71 The SAC also harbours intertidal sand- and mudflats. The sand is subject to wave action and scouring by the river, which is reflected by a mobile infaunal community consisting mainly of crustaceans and few polychaetes. More sheltered areas of the estuary support robust polychaetes, amphipods, oligochaetes and enchytraeids.

Qualifying Features (JNCC, 2020g)

3.2.72 Annex I habitats that are a primary reason for selection of this site:

- Estuaries; and
- Mudflats and sandflats not covered by seawater at low tide.

3.2.73 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Sea lamprey; and
- River lamprey.

Conservation Objectives (Natural England, 2014i)

3.2.74 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change; the conservation objectives are to:

3.2.75 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;

- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

Threats / Pressures to Site Integrity (Natural England, 2015)

3.2.76 The following threats / pressures to the site integrity of the Tweed Estuary SAC have been identified in Natural England's Site Improvement Plan:

- Public access / disturbance;
- Water pollution;
- Invasive species;
- Changes in species distribution;
- Predation;
- Coastal squeeze;
- Transportation and service corridors;
- Change in land management;
- Air pollution: Risk of atmospheric nitrogen deposition; and
- Fisheries: Commercial marine and estuarine.

The Wash and North Norfolk Coast SAC

Introduction

3.2.77 The Wash is the largest marine embayment (107,718ha) with the second largest intertidal sediment flats in the country. It comprises extensive fine sand and coarse sand banks, which support a community of polychaetes, bivalves and crustaceans. Some unusual communities also occur, including brittlestar beds and reef-building ross worm *Sabellaria spinulosa*.

3.2.78 The North Norfolk Coast is the only British example of a barrier beach system, with extensive areas of saltmarsh with characteristic creek patterns having developed behind sand and shingle spits and bars. Communities include the bivalve peppery furrow shell *Scrobicularia plana* and lugworm *Arenicola marina.* In the more exposed open coast areas, the fauna is sparser.

3.2.79 The SAC is important for breeding and moulting of one of Europe's largest populations of common seal *Phoca vitulina*. Furthermore, the intertidal mudflats and salt marshes represent one of Britain's most important winter-feeding areas for waders and wildfowl.

Qualifying Features (JNCC, 2020c)

3.2.80 Annex I habitats that are a primary reason for selection of this site:

- Sandbanks which are slightly covered by sea water all the time;

- Mudflats and sandflats not covered by seawater at low tide;
- Large shallow inlets and bays;
- Reefs;
- Salicornia and other annuals colonizing mud and sand;
- Atlantic salt meadows (*Glauco-Puccinelllietalia maritimae*); and
- Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticose*).

3.2.81 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- Coastal lagoons

3.2.82 Annex II species that are a primary reason for selection of this site:

- Harbour seal *Phoca vitulina*

3.2.83 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Otter *Lutra lutra*

Conservation Objectives (Natural England, 2014j)

3.2.84 With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features' listed below), and subject to natural change; the conservation objectives are to:

3.2.85 Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

Threats / Pressures to Site Integrity (Natural England, 2014k)

3.2.86 The following threats / pressures to the site integrity of The Wash and North Norfolk Coast SAC have been identified in Natural England's Site Improvement Plan:

- Inappropriate water levels;

- Public access / disturbance;
- Siltation;
- Fisheries: Recreational marine and estuarine;
- Invasive species;
- Inappropriate coastal management;
- Fisheries: Commercial marine and estuarine;
- Predation;
- Coastal squeeze;
- Change in land management;
- Air pollution: Impact of atmospheric nitrogen deposition; and
- Changes in species distributions.

4.0 TEST OF LIKELY SIGNIFICANT EFFECTS

4.1 Introduction

4.1.1 This section examines the LSEs of the Proposed Development. It is structured by development phase. Within each development phase each potential impact pathway (e.g., noise & visual disturbance, air quality etc.) is discussed separately, covering all European sites to which that impact pathway applies. Each European site to which an impact pathway potentially applies is considered below under the heading describing the type of impact and shown on Figure 4-1: European Designated Sites Screened into the Assessment of LSE. The analysis is summarised in the screening matrices in Appendix C of this HRA.

4.2 Construction

Direct Habitat Loss

4.2.1 The Main Site is located immediately adjacent to the Teesmouth and Cleveland Coast SPA and Ramsar. There will be no direct loss of habitat which forms part of the European designated sites within the Main Site.

4.2.2 The Main Site will require a hydrogen pipeline network to various potential industrial off-takers across the Tees Valley to the Production Facility. Various construction methodologies are being considered including Horizontal Direct Drilling (HDD), below ground open-trench, installation on existing above ground pipe racks, and repurposing and reuse of existing pipelines; however, this is subject to ongoing design work, discussions with landowners and statutory consultees as well as being informed by environmental surveys.

4.2.3 The Teesmouth and Cleveland Coast SPA and Ramsar are within the boundary of Proposed Development Site, and there is thus potential for direct loss of habitat where HDD launch pits, open cut trenches or new above ground pipe racks are proposed within or immediately adjacent to the designated sites.

4.2.4 **It is expected at this stage that careful routing decisions or construction techniques will be used to avoid any direct loss of habitat within a European site boundary. However, that cannot be confirmed at this point and therefore habitat loss within the Teesmouth and Cleveland Coast SPA and Ramsar is screened into Appropriate Assessment.**

4.2.5 There will be no direct habitat loss within any other European sites listed in Tables 3-1 and 3-2 and these can be screened out.

Loss of Functionally Linked Habitat

4.2.6 Habitats within and adjacent to the Proposed Development Site have the potential to be used by the qualifying species of the Teesmouth and Cleveland Coast SPA and Ramsar for breeding, roosting and/or feeding.

4.2.7 **Bird surveys to inform the Proposed Development are ongoing at the time of writing. On a precautionary basis, direct loss of functionally linked habitat used by**

the qualifying bird species of the Teesmouth and Cleveland Coast SPA and Ramsar is screened into Appropriate Assessment.

4.2.8 The North York Moors SPA is designated for breeding golden plover which nest within the moorland vegetation. The site is also designated for breeding merlin which nest within mature of degenerate heather. As the habitats within and adjacent to the Proposed Development site are unsuitable for breeding golden plover and merlin there will be no LSE and this pathway can be screened out.

4.2.9 Northumbria Coast SPA/Ramsar is the next closest European site designated for bird species. It is located 10.1 km north of the Proposed Development Site. According to unpublished Natural England guidance on functionally linked land Impact Risk Zones for sites designated for birds[2], significant impacts on functionally- linked habitats from this type of development will not arise more than 10 km at most from the designated site. There will thus be no LSEs and this pathway can be screened out.

4.2.10 All other European sites listed in Tables 3-1 and 3-2 are designated for habitats or non-avian qualifying features and can be screened out.

Noise and Visual Disturbance

4.2.11 Noise and visual disturbance during the construction phase of the Proposed development has the potential to disturb the bird assemblage of the Teesmouth and Cleveland Coast SPA and Ramsar. At the Main Site, visual and noise disturbance could arise from increased human activity on site, the use of machinery and plant and construction of the new building (the tallest element will be the Flare, with a maximum height of 100 m). Visual and noise disturbance from human activity, plant and machinery could also occur during the construction of new pipeline routes.

4.2.12 The Natural England Site Improvement Plan (SIP) for the Teesmouth and Cleveland Coast SPA / Ramsar highlights that the site is sensitive to public access and disturbance, primarily as a result of recreational users accessing the beach (Natural England, 2014a). This recreational pressure effect is primarily due to the birds responding to visual and (probably to a lesser extent) auditory stimuli, which also result from the construction / decommissioning or operation of nearby industrial plants. Therefore, it is considered that the SPA / Ramsar is sensitive to visual and noise disturbance associated with the Proposed Development.

4.2.13 A study on recreational disturbance in the Humber (Fearnley, Liley & Cruickshanks, 2012) assesses different types of noise disturbance on waterfowl referring to studies relating to aircraft (see Drewitt, 1999), traffic (Reijnen, Foppen, & Veenbaas, 1997), dogs (Lord, Waas, & Innes 1997; Banks & Bryant 2007) and machinery (Delaney et al, 1999). These studies identified that there is still relatively little work on the effects of different types of water-based craft and the impacts from jet skis, kite surfers, windsurfers etc. (see Kirby *et al*, 2004 for a review). Some types of disturbance are clearly likely to invoke different responses. In very general terms, both distance from the source of disturbance and the scale of the disturbance (noise level, group size) will influence the response (Delaney *et al*, 1999; Beale & Monaghan, 2005). On UK

[2] Knight M. (March 2019). Impact Risk Zones Guidance Summary – Sites of Special Scientific Interest Notified for Birds. Version 1.1. 8pp.

estuaries and coastal sites, a review of WeBS data showed that, among the volunteer WeBS surveyors, driving of motor vehicles and shooting were the two activities most perceived to cause disturbance (Robinson & Pollitt, 2002).

4.2.14 The degree of impact that varying levels of noise will have on different species of bird is relatively poorly understood. Research published by the Institute of Estuarine & Coastal Studies in 2013, summarises the key evidence base relating to this impact pathway[3]. Based on the observed responses of waterbirds to noise stimuli, an acceptable receptor dose (i.e., maximum noise level at the bird) of 'below 70 dB' has been identified in discussion with Natural England on schemes in other parts of England and elsewhere on the Tees. As part of discussions involving the adjacent Net Zero Teesside Project Natural England officers advised that a 70 dB metric was appropriate to use for impact assessment regarding the Teesmouth and Cleveland Coast SPA / Ramsar. Natural England confirmed that the birds of the SPA / Ramsar site are tolerant of a wide range of noise variation, including levels higher than those to which they are currently exposed at Coatham Dunes[4].

4.2.15 The Teesmouth and Cleveland Coast SPA/Ramsar site harbours qualifying species throughout the entire year (breeding terns and avocet in summer and non-breeding waders in winter), and visual and noise disturbance associated with construction / decommissioning work is thus not a seasonal issue. It requires consideration throughout the entire year. However, only some parts of the SPA / Ramsar are used for nesting by the breeding species.

4.2.16 Given that that the SPA / Ramsar is directly adjacent to the Main Site and connection corridors, it is possible that construction activities could result in visual disturbance of the SPA's / Ramsar's waterfowl if it takes place during the passage or winter period (i.e. October to March inclusive), or to the nesting tern and avocet for which the SPA / Ramsar is designated if it takes place during the breeding period (i.e. March to June), depending on location.

4.2.17 It is also possible that noise disturbance may occur depending on the noise levels arising from the construction works (for example piling at the Main Site).. Therefore, it is concluded that the Proposed Development could result in LSEs on the SPA / Ramsar birds regarding noise disturbance.

4.2.18 In addition to noise, large structures (e.g., tall buildings, bridges and wind turbines) can change the behaviour of birds by affecting their sight- and flight lines. This can result in a collision risk barrier effect or displacement, which could make birds more vulnerable to predation or result in the loss of foraging habitat. The maximum building height and the average building height of the Proposed Development are the main parameters to consider regarding the potential impact of tall buildings. The potential for buildings and structures within the main site to result in visual disturbance will be discussed in further detail at Appropriate Assessment.

[3] The University's research is available at the following link: http://bailey.persona-pi.com/Public-Inquiries/M4%20-%20Revised/11.3.67.pdf.
[4] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010103/EN010103-002330-NZT%20DCO%205.13%20-%20Habitats%20Regulations%20Assessment%20Report%20(Clean)%20Oct%202022%20(D9).pdf

4.2.19 **Noise and visual disturbance of the non-breeding and breeding interest features of the Teesmouth & Cleveland Coast SPA / Ramsar is screened into Appropriate Assessment.**

4.2.20 Noise and visual disturbance for all other sites listed in Tables 3-1 and 3-2 can be screened out due to distance.

Noise and Visual Disturbance in functionally linked habitat

Birds

4.2.21 Habitats within and adjacent to the Proposed Development Site have the potential to be used by the qualifying bird species of the Teesmouth and Cleveland Coast SPA and Ramsar for breeding, roosting and/or feeding. **Bird surveys are ongoing at the time of writing, therefore disturbance of qualifying bird species within functionally linked habitats has been screened into Appropriate Assessment on a precautionary basis.**

Marine Mammals

4.2.22 Within the wider area which surrounds the Proposed Development Site there are four SACs designated for marine mammals:

- Berwickshire and North Northumberland Coast SAC (approximately 87 km to the north; designated partly for grey seal),
- the Humber Estuary SAC (approximately 106 km to the south-east; designated partly for grey seal),
- Southern North Sea SAC (approximately 101 km to the east; designated partly for harbour porpoise).
- The Wash and North Norfolk Coast SAC (approximately 187 km to the south-east; designated partly for harbour seal).

4.2.23 All these qualifying marine mammal species are mobile and might travel far beyond the designated site boundaries. Therefore, it cannot be excluded that the Proposed Development (or the area immediately surrounding it) might perform a role in supporting these qualifying species.

4.2.24 The Proposed Development Site is located within the International Council for the Exploration of the Sea (ICES) Greater North Sea Ecoregion, which in part forms the boundaries for the Inter-Agency Marine Mammal Working Group (IAMMWG) Marine Mammal Management Units (MUs) for the North Sea (ICES, 2021; IAMMWG, 2022).

4.2.25 The presence of harbour and grey seals within the Teesside area is well known, including abundances, seasonality, and known haul out locations (locations on land where seals come ashore to rest, moult or breed) for these species. The immediate area around the Proposed Development Site is of local importance for harbour seal and grey seal due to the presence of a breeding colony and haul-out sites at Seal Sands and along Greatham Creek. Harbour seals are the most abundant (INCA, 2022).

Harbour Seal

4.2.26 Seal Sands is a known haul-out site for a breeding colony of harbour seal, which use the intertidal mudflats in this area. Greatham Creek is also known to be frequented by small numbers of individuals, which haul-out at multiple locations along the creek, particularly at Bailey Bridge.

4.2.27 Seals Sands and its population in the River Tees, is the only significant haul-out site within the NE England MU (Natural Environment Research Council Special Committee on Seals, 2021), which also includes harbour seals found at Holy Island, situated off the north-east coast of England, south of Berwick-upon-Tweed.

4.2.28 Incidental sightings of harbour seal were recorded by AECOM on Seal Sands during Proposed Development related surveys, on nine different days between October 2022 and March 2023. A total of 144 were recorded across this period and all were considered to be adults. The seals were observed hauled-out at scattered locations on Seal Sands and in Greatham Creek.

4.2.29 The maximum number of harbour seal in the Tees Estuary has increased overall since 2010, with the highest estimate recorded to date observed in August 2022 with 162 individuals (INCA, 2022). This included 36 pups, the highest number and increase recorded. There were also no pup deaths reported during weaning in 2022, being the highest survivability rate recorded since 1989. Within the Tees Estuary, pupping is known to take place mostly at Seal Sands, with some also at Bailey Bridge.

4.2.30 The pupping season at the Tees typically occurs during late June and lasts for about three weeks into late July, typical of other populations in the north-east Atlantic (INCA, 2022). The moulting season follows, typically from mid-August until early September, when seals spend a considerable amount of time out of the water to rest and conserve heat.

4.2.31 Although harbour seals are present within the vicinity of the Proposed Development Site and are likely to use the adjacent sea area for foraging, in the context of wider populations in the North Sea, the immediate Study Area is not considered to be heavily used by this species compared to other areas around the UK coast (refer to Chapter 14: Marine Ecology (PEI Report, Volume I) for further detail).

Grey Seal

4.2.32 The Proposed Development Site and the wider Tees area falls within the North-east England Seal MU. Within this management unit there are major colonies of grey seals in both the north (Isle of May, Fast Castle, Farne Islands) and south (Donna Nook, Blakeney Point and Horsey/Winterton), either side of the Tees area (refer to Chapter 14 of the PEI Report for further detail).

4.2.33 The latest count of grey seals in the North Sea, which included the North-east England MU, as well as East Scotland and Southeast England MUs, took place in between 2016-2018 and was estimated at 19,160 individuals (Natural Environment Research Council Special Committee on Seals, 2021). Pup production in North-east England has continued to increase rapidly with a mean increase of 53% between 2014 and 2019. Most of the increase in the North Sea has been due to the continued

rapid expansion of newer colonies on the mainland coasts in Berkwickshire, Lincolnshire, Norfolk and Suffolk.

4.2.34 Grey seals forage in the open sea in depths up to 100 m and, like harbour seals, they return regularly to haul-out on land where they rest, moult and breed. They may range widely to forage, with foraging trips lasting between 1 to 30 days (Natural Environment Research Council Special Committee on Seals, 2021). Modelling has shown that grey seals typically spend 43% of their foraging time within 10 km of a haul-out site (McConnell *et al*., 1999), with maximum foraging range believed to be up to 135 km (Natural Environment Research Council Special Committee on Seals, 2020).

4.2.35 Seal Sands site on the River Tees is an important haul-out site for this species, although the grey seal population here is smaller than that for harbour seals (INCA, 2022). However there has been an overall increase in the grey seal population since 2010. Maximum recordings of individuals on Seal Sands were down between 2018 and 2020. However, a peak count of 96 individuals was recorded in August 2022, when all grey seals counted were hauled-out on Seal Sands, suggesting that population size is increasing.

4.2.36 Incidental sightings recorded by AECOM during Project related surveys on nine different days between October 2022 and March 2023 observed 94 adult grey seals, all hauled-out on Seal Sands.

4.2.37 In December 2022, a grey seal pup at Seal Sands was recorded alongside an adult female, which is thought to be the first observation of a grey seal born in the Tees (INCA, 2022). Grey seals are also known to use Greatham Creek but are only occasionally recorded there in small numbers.

4.2.38 Although grey seals are present within the Study Area and are likely to use the adjacent sea area for foraging, in the context of the populations in the wider North Sea the Study Area is not considered to be heavily used by this species.

Noise and Visual Disturbance - Seals

4.2.39 The potential for noise and visual disturbance to affect harbour seals and grey seals is considered in Chapter 14: Marine Ecology (PEI Report, Volume I). Marine and land-based construction activities associated with the Proposed Development will create airborne sound and changes in visual cues which have the potential to disturb seals that are hauled-out nearby or have surfaced. The effects of disturbance could include a cessation of feeding, travelling, resting, breeding and/or socialising. Long-term effects of repeated disturbance could include a permanent displacement and/or a decline in fitness and productivity (such as moulting and breeding success).

4.2.40 **Noise modelling is being completed at the time of writing, therefore based upon a precautionary approach, noise and visual disturbance of grey seals and harbour seals within functionally linked land (qualifying features of the Berwickshire and North Northumberland Coast SAC, the Humber Estuary SAC and the Wash and North Norfolk Coast SAC) are taken forward to Appropriate assessment.**

Harbour Porpoise

4.2.41 The Southern North Sea SAC, which is designated for harbour porpoise, is located over 100 km away from the Proposed Development Site. The Inspectorate have agreed that effects upon the Southern North Sea SAC can be scoped out of the ES as there are no impact pathways from underwater sound arising from the proposals (The Planning Inspectorate, 2023). As such, LSE upon harbour porpoise is also screened out.

Migratory Fish

4.2.42 Two sites to the north of the Proposed Development are designated for migratory fish; the River Tweed SAC (approx. 107 km to the north) and the Tweed Estuary SAC (approx. 135 km to the north). The River Tweed SAC is designated for Atlantic salmon and sea lamprey, while the Tweed Estuary SAC is designated for sea lamprey only. The aforementioned Humber Estuary SAC is also designated partly for sea lamprey. These species are anadromous (i.e. spawn upstream in rivers) and complete their life cycle in the sea. Atlantic salmon in particular are known to undertake long migratory journeys in the sea during their adult life stage. Therefore, it was considered to what extent the Proposed Development could interfere with fish migration routes along the east coast of England.

4.2.43 **The proposed connection routes will cross the River Tees and Greatham Creek, and there is potential for noise and vibration arising from construction to affect migratory fish. Therefore, based upon a precautionary approach, the potential for noise and vibration to affect Atlantic salmon and sea lamprey (qualifying features of the River Tweed SAC and the Tweed Estuary SAC) will be taken forward to Appropriate Assessment.**

Atmospheric Pollution

4.2.44 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH_3) and sulphur dioxide (SO_2) and are summarised in Table 4-1. Ammonia can have a directly toxic effect upon vegetation, particularly at close distances to the source such as near road verges (CEH, 2016a). NOx can also be toxic at very high concentrations (far above the annual average Critical Level). However, in particular, high levels of NOx and NH_3 are likely to increase the total nitrogen deposition to soils, potentially leading to deleterious effects in resident ecosystems. For example, an increase in the total nitrogen deposition from the atmosphere is widely known to enhance soil fertility and to lead to eutrophication. This often has adverse effects on the community composition and quality of semi-natural, nitrogen-limited terrestrial and aquatic habitats (Wolseley et al, 2006; Dijk, 2011). The total nitrogen deposition resulting from a plan or project is therefore often assessed as the overarching parameter determining atmospheric pollution.

4.2.45 The only pollutants likely to be associated with construction of the Proposed Development are NOx and ammonia, which will be primarily determined by the associated traffic movements (relating to both on-site construction traffic and commuter traffic) and any diesel plant required for construction or decommissioning.

Table 4-1: Main sources and effects of air pollutants on habitats and species (CEH, 2016b)

POLLUTANT	SOURCE	EFFECTS ON HABITATS AND SPECIES
Ammonia (NH_3)	Ammonia is a reactive, soluble alkaline gas that is released following decomposition and volatilization of animal wastes. It is a naturally occurring trace gas, but ammonia concentrations are directly related to the distribution of livestock. It also derives from some vehicle exhausts. Ammonia reacts with acid pollutants such as the products of SO_2 and NO_X emissions to produce fine ammonium (NH_{4+}) - containing aerosol. Due to its significantly longer lifetime, NH_{4+} may be transferred much longer distances (and can therefore be a significant trans-boundary issue). While ammonia deposition may be estimated from its atmospheric concentration, the deposition rates are strongly influenced by meteorology and ecosystem type.	The negative effect of NH_{4+} may occur via direct toxicity, when uptake exceeds detoxification capacity and via N accumulation. Its main adverse effect is eutrophication, leading to species assemblages that are dominated by fast-growing and tall species. For example, a shift in dominance from heath species (lichens, mosses) to grasses is often seen. As emissions mostly occur at ground level in the rural environment and NH_3 is rapidly deposited, some of the most acute problems of NH_3 deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides (NOx)	Nitrogen oxides are mostly produced in combustion processes. Half of NO_X emissions in the UK derive from motor vehicles, one quarter from power stations and the rest from other industrial and domestic combustion processes. In contrast to the steep decline in Sulphur dioxide emissions, nitrogen oxides are falling	Direct toxicity effects of gaseous nitrates are likely to be important in areas close to the source (e.g. roadside verges). A critical level of NOx for all vegetation types has been set to 30 ug/m3. Deposition of nitrogen compounds (nitrates (NO_3), nitrogen dioxide (NO_2) and nitric acid (HNO_3)) contributes to the total

POLLUTANT	SOURCE	EFFECTS ON HABITATS AND SPECIES
	slowly due to control strategies being offset by increasing numbers of vehicles.	nitrogen deposition and may lead to both soil and freshwater acidification. In addition, NOx contributes to the eutrophication of soils and water, altering the species composition of plant communities at the expense of sensitive species.
Nitrogen deposition	The pollutants that contribute to the total nitrogen deposition derive mainly from oxidized (e.g. NO_X) or reduced (e.g. NH_3) nitrogen emissions (described separately above). While oxidized nitrogen mainly originates from major conurbations or highways, reduced nitrogen mostly derives from farming practices. The N pollutants together are a large contributor to acidification (see above).	All plants require nitrogen compounds to grow, but too much overall N is regarded as the major driver of biodiversity change globally. Species-rich plant communities with high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication. This is because many semi-natural plants cannot assimilate the surplus N as well as many graminoid (grass) species. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.

4.2.46 The Air Pollution Information System (APIS) forms the major source of information regarding the air quality impact pathway. It specifies a NOx concentration (Critical Level) for the protection of vegetation of 30 μgm^{-3}. In addition, ecological studies have determined 'Critical Loads' for atmospheric nitrogen deposition (that is, NOx combined with ammonia NH_3).

4.2.47 The Teesmouth and Cleveland Coast SPA / Ramsar is partly designated for breeding little tern, which make their simple nests ('scrapes') in various habitats, such as shingle and dunes. One of their requirements for breeding success is an absent or short sward, so they can form their nests. APIS identifies that terns are sensitive to the broad impacts from NOx, as excessive input might result in the increase of tall grasses and soil acidification, preventing the ability of terns to breed successfully.

4.2.48 The APIS website has a Site Relevant Critical Load Function tool which enables the sensitivity of each interest feature of each European site to be examined. Scrutiny of that tool for Teesmouth and Cleveland Coast SPA / Ramsar site identifies that the only species for which APIS suggests adverse effects may occur due to elevated NOx or nitrogen deposition are the nesting terns, for the reasons given above, and nesting avocet. APIS identifies that this species is sensitive to nitrogen deposition on its nesting habitat. However, the habitat associated with this species on APIS is littoral sediment, which has a relatively high nitrogen tolerance (a minimum critical load of 20 kg N/ha/yr).

4.2.49 According to Natural England Guidance (Natural England, 2018b) and Institute of Air Quality Management Guidance (IAQM, 2019) beyond 200 m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant. This is therefore the distance that has been used throughout this HRA to determine whether the Teesmouth and Cleveland Coast SPA / Ramsar is likely to be significantly affected by site traffic associated with the Proposed Development.

4.2.50 An assessment of the traffic likely to be associated with the project has been conducted. The greatest number of vehicle movements will occur in the construction / decommissioning phase of the development. A Transport Assessment (TA) is being undertaken to determine the effects of the construction phase on the transport network, which includes a description of current and future baseline conditions (including link and junction flows), calculations of the construction traffic flows and the likely routes to be taken by site traffic and abnormal traffic loads. An Air Quality Impact Assessment will also be undertaken and using the National Highways Design Manual for Roads and Bridges (DMRB) screening model, Volume LA 105 (Air Quality).

4.2.51 The results of the modelling are not available at time of writing. Therefore, Likely Significant Effects on the nesting terns and nesting avocet through NOx and nitrogen deposition cannot be screened out at this point. **Therefore, atmospheric pollution in the Teesmouth and Cleveland Coast SPA / Ramsar due to construction / decommissioning traffic is screened into Appropriate Assessment.**

Changes in Water Quality (including Nutrient Neutrality)

4.2.52 There is potential for changes in water quality resulting from:

- disturbance of contaminated soils and perched groundwater, and the creation of new pathways to sensitive receptors (including construction workers and controlled waters) during construction;
- pollution of surface watercourses within or near the Proposed Development Site during construction and decommissioning, due to spillages or polluted surface water run-off entering a watercourse;

4.2.53 The quality of the water that feeds European sites is an important determinant of the nature of their habitats and the species they support, and therefore integral to meeting a site's Conservation Objectives. Poor water quality can have a range of environmental impacts. At high concentrations, toxic chemicals and heavy metals can result in the immediate death of aquatic life (both flora and fauna). At lower

concentrations, negative impacts may be more subtle and could increase vulnerability to disease or change the behaviour of wildlife. These substances, especially Polychlorinated Biphenyls (PCBs), accumulate in minuscule benthic organisms and then biomagnify as they are passed up the food chain. Furthermore, they are not easily biodegraded over time. Overall, there are two broad types of toxic compounds in aquatic environments, namely synthetic and non-synthetic (i.e. naturally occurring) substances.

4.2.54 Toxic contamination may arise from synthetic toxic compounds, such as pesticides, PCBs (polychlorinated biphenyls) and biocides. Some of these substances are endocrine disrupting chemicals, which have the capacity to mimic animal hormones, prevent their production or breakdown. As discussed above, many of the synthetic compounds tend to accumulate over time and are likely to be present in animal tissue or substrate for long periods of time. Another factor in determining the magnitude of water pollution is the amount of hydrological mixing and tidal flushing that a site receives.

4.2.55 Non-synthetic compounds, such as fuel oils and heavy metals, occur in the environment naturally at relatively low concentrations, but become toxic at higher concentrations. Oil pollution is particularly damaging (and persistent) in intertidal environments, where natural degradation and weathering of oils is slow. Aside from their significant contribution to nutrient levels, Wastewater Treatment Works (WwTWs) are also major contributors of heavy metals, such as zinc, lead, copper and nickel. Heavy metal pollution might change the benthic assemblages in intertidal habitats. For example, it was demonstrated that a high concentration of heavy metals resulted in less diverse communities with lower overall abundances of crustaceans and polychaetes (Stark, 1998).

4.2.56 The Teesmouth and Cleveland Coast SPA / Ramsar is designated for its breeding tern and avocet and overwintering waterfowl. While aquatic pollutants may have direct effects on SPA / Ramsar birds, it is the indirect effects of synthetic and non-synthetic compounds on their supporting habitats and prey species that are of greatest concern. Natural England's SIP for the SPA / Ramsar indicates that past improvements to wastewater treatment and catchment management have significantly reduced the input of nutrients and contaminants into the Tees (Natural England, 2014a). However, the SIP still identifies water pollution as a concern for the SPA / Ramsar because contaminants from historic pollution events are stored in the sediments, potentially still affecting the benthic fauna.

4.2.57 To establish the ecological baseline communities, a Phase 1 study and macroinvertebrate sampling was undertaken in sites relevant to the Proposed Development. These included Greatham Creek and Bran Sands. The saltmarsh habitat located around Greatham Creek is comprised of species such as annual sea-blite *Suaeda maritima*, common saltmarsh-grass *Puccinellia maritima*, sea plantain *Plantagon maritima*, greater sea-spurrey *Spergularia media*, sea lavender *Limonium vulgare*, long-spiked glasswort *Salicornia dolichostacha*, yellow glasswort *Salicornia fragilis*, sea aster *Aster tripolium*, sea arrowgrass *Triglochin maritima* and saltmarsh rush *Juncus gerardii*. Bran Sands is an area of intertidal muddy sandflats to the north

of the Proposed Development. The results show that Bran Sands supports relatively complex and diverse benthic communities, including species such as common cockle *Cerastoderma edule* and lugworm *Arenicola marina*.

4.2.58 While none of the species of the infaunal community are qualifying features of the SPA / Ramsar, they are likely to be integral food sources for qualifying waders, including redshank and knot. These species forage on a range of species, such as molluscs and crustaceans. By affecting the prevailing water quality, the Proposed Development might reduce the abundance and diversity of benthic invertebrates, which could have a knock-on effect on the qualifying bird species. This is particularly important because, despite the industrialised nature of the surrounding area, chemical sediment analysis has shown no evidence of high contaminant levels that might affect benthic habitat and / or species.

4.2.59 It is considered that the potential for toxic contamination of European sites during the construction phase is an issue that requires further consideration, given that in places the SPA/Ramsar site lies adjacent to the Proposed Development Site, and in some instances overlaps with the boundary. Given the short distance involved, there is potential for toxic runoff and leachate reaching sensitive ecological receptors. **This impact pathway is screened in for Appropriate Assessment regarding the Teesmouth and Cleveland Coast SPA / Ramsar as it could affect the ability of the site to achieve its Conservation Objectives by impacting the supporting processes on which the qualifying features of the SPA/Ramsar rely.**

4.2.60 During the construction / decommissioning phase of the Proposed Development, non-toxic wastewater will be primarily produced by toilets for construction / decommissioning staff. This will be treated on-site using package plant with effluent disposed off-site (i.e. not discharged into local watercourses). Therefore, it is concluded that organic pollution from sewage effluent is not an issue for the construction or decommissioning period. Construction / decommissioning period treated wastewater impacts on the Teesmouth and Cleveland Coast SPA / Ramsar are therefore screened out from Appropriate Assessment as there is no mechanism for it to affect the Conservation Objectives of the site.

4.2.61 **In summary, the Proposed Development is screened in for Appropriate Assessment due to potential water quality impacts during construction / decommissioning as a result of oil, fuel and chemical spillages resulting in toxic surface run-off and leachate into the Teesmouth and Cleveland Coast SPA / Ramsar.**

4.3 Operational Period

Visual and noise disturbance

4.3.1 Once complete, the Proposed Development will be operational 24 hours a day. An assessment of the potential for visual and noise disturbance during the operational period was therefore undertaken. It is considered that activity within the Main Site options would not result in significant visual disturbance of qualifying birds in the Teesmouth and Cleveland Coast SPA / Ramsar because the site of the Proposed Development has a long history of industrial use and the overwintering birds in this SPA / Ramsar have traditionally been used to activity from site staff even though

numbers of people in the area have been low in recent years. Overall, visual disturbance of Teesmouth and Cleveland Coast SPA / Ramsar during operation is screened out from Appropriate Assessment due to habituation which will not interfere with the ability of the SPA to achieve its Conservation Objectives.

4.3.2 **At the time of writing, noise modelling for the main site was not available. Therefore, based upon a precautionary approach, LSE on the Teesmouth and Cleveland Coast SPA / Ramsar from operational noise is screened into Appropriate Assessment. All other European sites can be screened out due to their distances from the Project.**

Atmospheric pollution

4.3.3 At time of writing, an Atmospheric Impact Assessment (AIA) is being undertaken using detailed air dispersion modelling to determine the potential impact of the NOx and ammonia emissions from the operational power station. However, it has not yet been completed.

4.3.4 It has already been discussed in the construction / decommissioning period section of this HRA report that the terns and nesting avocets of the Teesmouth & Cleveland Coast SPA / Ramsar are the only species which are sensitive to the broad impacts from NOx and nitrogen deposition. The APIS Site Relevant Critical Load Function tool also identifies that:

- No species are identified as being adversely affected by acidification (which can result from nitrogen deposition); and
- Since the SPA / Ramsar is designated for breeding tern and avocet and for passage / wintering waterfowl and waders, toxic effects of ammonia on vegetation are less ecologically important to the SPA / Ramsar site than its role in nitrogen deposition.

4.3.5 The air quality modelling as it currently stands identifies that several of the modelled locations within Teesmouth & Cleveland Coast SPA/Ramsar will be subject to nitrogen deposition as a result of the scheme which exceeds 1% of the minimum part of the critical load range (reaching 2.7% of the critical load). In line with Natural England guidance this means that likely significant effects cannot be dismissed on purely mathematical grounds. Consideration will be required of the areas affected and the extent to which this will affect those SPA and Ramsar birds (terns and avocets) that are sensitive to nitrogen deposition. Since air quality modelling is still being finalised at time of writing and the 1% of the critical load threshold is exceeded, **LSEs on the SPA/Ramsar site cannot be dismissed and Appropriate Assessment is required.**

4.3.6 The North York Moors SAC is designated for blanket bogs (nitrogen Critical Load of 5-10 kg N/ha/yr) and two types of heathland communities (nitrogen Critical Load of 5-10 kg N/ha/yr). According to the Site Relevant Critical Load page on APIS for the SPA these are not only the reasons for SAC designation but also the key habitats on which the SPA species rely within the SPA boundary. As such these two sites are discussed together here despite having different interest features as the relevant habitats are identical. A review of habitat mapping in MAGIC indicates that the north-western

section of the SAC comprises only heathland and the critical Load of 5-10 kg N/ha/yr applicable to heathland is therefore to be used and there will be no impact on bogs. **The North York Moors SAC/SPA has been included in the air quality modelling for the PEI Report because it falls beyond the 10 km zone used for the air quality assessment. However, this will be reviewed in the context of the latest guidance for the ES**.

4.3.7 Durham Coast SAC is not identified on APIS as being sensitive to nitrogen or acid deposition and no Critical Loads are available for this site on which to base any assessment. With regard to the Northumbria Coast SPA / Ramsar, according to APIS the only interest features sensitive to nitrogen deposition are the nesting terns. These colonies are located at the mouth of the Long Nanny Burn in Beadnell Bay, much further north than the area affected by the Proposed Development. Since these sites are either not sensitive to nitrogen deposition or will be affected to a negligible degree, LSEs on the Durham Coast SAC and the Northumbria Coast SPA / Ramsar from air pollution can be screened out.

4.3.8 The operational phase of the Proposed Development will also be associated with site traffic (e.g. vehicles transporting staff or machinery within the site) and commuter traffic. However, Chapter 15: Traffic and Transport (PEI Report, Volume I) identifies that the Proposed Development will have a maximum of 130people (staff) working on a shift basis over 24 hours per day and as such this is not considered to result in a severe impact upon the highway network, and no further assessment of the operational effects has been included... The traffic flow generated during the operational phase of the Proposed Development is well below the threshold for defining an 'Affected Road' in National Highways parlance[5] and is therefore considered to have a negligible effect on air quality. Pollution from operational vehicle movements is therefore screened out from Appropriate Assessment.

4.3.9 **In summary, the Proposed Development is screened in for Appropriate Assessment regarding operational atmospheric pollution due to the forecast nitrogen dose at the closest part of Teesmouth & Cleveland Coast SPA / Ramsar and North York Moors SAC / SPA.**

Water quality

4.3.10 In the absence of mitigation, similar water quality issues are likely to be relevant for the Proposed Development in the operational phase as apply in the construction / decommissioning phase. This includes potentially toxic surface run-off and leachate from machinery and plant involved in the day-to-day operation of the power plant, and non-toxic pollution from sewage effluent. Unmitigated, these pollutants may enter the Teesmouth and Cleveland Coast SPA / Ramsar directly or indirectly via groundwater / surface water in hydrological continuity with these European sites.

4.3.11 The effluent streams from the Proposed Development will include process water (e.g. process condensate from the reforming process, cooling tower blowdown water and demineralisation plant rejects), foul water and surface water runoff. A summary of

[5] Defined as a change of 1,000 two-way AADT (Annual Average Daily Traffic)

the water cycle is provided in Appendix 9D Nutrient Neutrality Screening Assessment (PEI Report, Volume III).

4.3.12 A new surface water drainage network and management system will be provided for the Main Site that will provide adequate interception, conveyance, and treatment of surface water runoff from buildings and hard standing. This will be separate to foul systems for welfare facilities and process effluent generated by the operation of the Proposed Development Site. The connection corridors will not require additional drainage as they will be using existing pipe racks, pipe bridges, culverts or otherwise installed underground.

4.3.13 Surface water drainage will discharge to the Tees Estuary via Dabholm Gut. There are three options for this route: 1) direct feed to Dabholm Gut (with any new pipework and outfall to be consented under a subsequent planning application); 2) discharge via the existing Brans Sands discharge pipeline; or 3) discharge via the NZT pipeline.

4.3.14 Due to the nature of the Proposed Development, it is likely that a range of different diffuse pollutant types (including nutrients) may be present in surface water runoff, with concentrations varying depending on many factors. However, this risk will be offset by the fact that the Proposed Development Site is a brownfield site that is currently not operating (i.e., surface water from the Proposed Development Site may already contain diffuse chemical pollutants).

4.3.15 A Surface Water Drainage Strategy will be defined in consultation with the Environment Agency, the Lead Local Flood Authorities and other statutory agencies.

4.3.16 Once operational the Proposed Development would provide staff with toilets that are connected to the mains. Wastewater will discharge to the NZT outfall at Tees Bay. In March 2022, Natural England published advice to competent authorities regarding the effects of increased nutrients on a series of European sites around England. For these identified European sites, Natural England's advice was that their ability to achieve their conservation objectives was compromised by existing nutrient inputs from agricultural and treated effluent sources. In their March 2022 letter, Natural England identified Teesmouth & Cleveland Coast SPA as one of the European sites suffering from excess nutrient inputs. This **impact pathway is therefore screened in for Appropriate Assessment.**

4.3.17 **In summary, the Proposed Development in the operational period is screened in for Appropriate Assessment regarding the Teesmouth and Cleveland Coast SPA / Ramsar, pending further design information. This is due to the following impact pathways that could affect the Conservation Objectives of the SPA through affecting the supporting processes of the SPA:**

- Water quality impacts as a result of oil, fuel and chemical spillages resulting in toxic surface run-off and leachate;
- Wastewater effluent from domestic water usage within the site.

4.3.18 All other European designated sites are screened out due to the distance from the Project or the lack of hydrological connections.

Coastal squeeze

4.3.19 Coastal squeeze is a term that originates from coastal management, whereby intertidal habitats which could be used by the Teesmouth and Cleveland Coast SPA / Ramsar birds are lost as the sea level rises and inland brownfield development (e.g., a sea wall or an industrial complex) prevents the inland migration of habitats (e.g. saltmarsh) and its associated species. A good background summary on this impact pathway can be found in Doody (2013). As a result, the habitat is 'squeezed' and reduces in size. This is a significant process, particularly in geographic areas that are highly urbanised or that are rapidly transitioning from an undeveloped to developed state.

4.3.20 The main site will be located on brownfield land in a coastal landscape. As such, the project will not result in any loss of greenfield land adjacent to the coast. Overall, it is considered that LSEs can be excluded, and coastal squeeze as a result of the Proposed Development is screened out from Appropriate Assessment as it will not arise.

4.3.21 **In summary, coastal squeeze will not arise and is therefore not taken forward to Appropriate Assessment.**

4.4 Decommissioning Period

4.4.1 The Production Facility will have a design life of 25 years (for each Phase). At the end of its operational life, the most likely scenario would be that the Proposed Development would be shut down, with all above ground structures on the Main Site removed, and the ground remediated as required to facilitate future re-use. The Applicant will assess at that time whether any infrastructure should be retained for future use. The same timescales would apply for the hydrogen pipeline and utility connections.

4.4.2 A Decommissioning Plan (DEMP) (including Decommissioning Environmental Management Plan) would be produced and agreed with the Environment Agency as part of the Environmental Permitting surrender process and pursuant to a DCO Requirement. The Decommissioning Environmental Management Plan would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated.

4.4.3 It is considered that the following pathways of effect could occur during decommissioning and based upon a precautionary approach, these will be considered further at Appropriate Assessment.

- Direct habitat loss;
- Loss of functionally linked land;
- Noise and visual disturbance;
- Noise and visual disturbance within functionally linked land;
- Atmospheric pollution;
- Changes in water quality;
- Effects on foraging resources which support qualifying bird species.

5.0 IN COMBINATION EFFECTS

5.1.1 It is a requirement of Regulation 63(a) of the 2017 Regulations to not only assess the impacts of a development project alone, but also to investigate whether there might be 'in-combination' effects with other projects or plans proposing development in adjacent authorities. In practice, such an 'in-combination' assessment is of greatest relevance when an impact pathway relating to a project would otherwise be screened out not because there is no impact pathway but because its individual contribution is considered to be inconsequential.

5.1.2 For example, other industrial development projects near the Proposed Development might also have effects on the air quality within the Teesmouth and Cleveland Coast SPA / Ramsar, acting in-combination with the potential NOx deposition from the CCGT units. Furthermore, the potential contaminant and nutrient input from the Proposed Development will act in-combination with water pollutants deriving from housing or industrial development allocated in Local Plans that cover adjacent authorities. Therefore, due consideration must be given to these 'in-combination' proposals, because they might exacerbate the impacts identified as relevant for the Proposed Development.

5.1.3 For the purposes of this HRA, have identified several plans, projects and strategies proposing / aiming for development, which may act in-combination with the Proposed Development have been identified. The following projects / plans require consideration:

- The Net Zero Teesside Project (awaiting Secretary of State's decision at time of writing) - This consists of a full chain carbon capture, utilisation and storage ('CCUS') project, comprising a CO_2 gathering network, including CO_2 pipeline connections from industrial facilities on Teesside to transport the captured CO_2 (including the connections under the tidal River Tees); a combined cycle gas turbine ('CCGT') electricity generating station with an abated capacity circa 850 gigawatts output (gross), cooling water, gas and electricity grid connections and CO_2 capture; a CO_2 gathering/booster station to receive the captured CO_2 from the gathering network and CCGT generating station; and the onshore section of a CO_2 transport pipeline for the onward transport of the captured CO_2 to a suitable offshore geological storage site in the North Sea.
- Clean Growth Strategy – Sets out the aim of the UK Government to deliver increased economic growth while decreasing emissions. The Strategy sets out policies and proposals to reduce emissions over the next decade, including the use of carbon capture and storage.
- Redcar & Cleveland Local Plan (Adopted May 2018) – The Redcar and Cleveland Local Plan sets out the vision and overall development strategy for the Borough in the planning period up to 2032. It details the provision of a minimum of 3,978 dwellings and 405 ha of employment land in the plan period; potential impacts to Teesmouth & Cleveland Coast SPA/Ramsar include recreational pressure leading to disturbance simultaneously with pipeline construction work at Coatham Dunes.

- Stockton-on-Tees Local Plan & Policies Map (Adopted January 2019) – The Stockton-on-Tees Local Plan sets out the detailed strategic development targets for the Borough in the planning period up to 2032. It sets out that a minimum of 10,150 new homes and 300 ha of employment land will be provided within the plan period; potential impacts to Teesmouth & Cleveland Coast SPA/Ramsar include recreational pressure leading to disturbance simultaneously with pipeline construction work at Coatham Dunes.
- Tees Valley Joint Minerals and Waste Development Plan Document (Adopted September 2011) – This Development Plan Document (DPD) contains the area's overall approach to the use of mineral resources and the management of waste. It consists of the Minerals and Waste Core Strategy DPD and the Mineral and Waste Policies and Sites DPD.
- South Tees Regeneration Master Plan (RMP, 2017) – The RMP is the overall vision and strategy for the South Tees area, seeking to bring new opportunities for investment and maximising economic development in the area; potential impacts to Teesmouth & Cleveland Coast SPA/Ramsar include recreational pressure and large-scale construction, leading to disturbance simultaneously with pipeline construction work at Coatham Dunes.
- Tees Valley Combined Authority (TVCA) – The TVCA has published three separate strategies ('Strategic Economic Plan', 'Investment Plan', 'Infrastructure Plan') that aim at increasing economic growth and creating more jobs in the Tees Valley area.
- Other projects listed in Chapter 23: Cumulative and Combined Effects of the (PEI Report, Volume I).

5.1.4 These will be analysed for the DCO Application HRA documentation, which will contain a Stage 2 Report to inform Appropriate Assessment. The in-combination assessment will particularly consider the potential cumulative effect of disturbance if increased recreational activity due to Local Plans and Proposed Development construction occur at the same time, and of the air quality and water quality pathways. However, none are expected to result in impact pathways being 'screened in' that have been 'screened out' in the preceding text. This is due to the precautionary nature of the Likely Significant Effect screening exercise undertaken for this HRA.

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APPENDIX A: FIGURES

Figure 1-1: Proposed Development Site from PEI Report, Volume II

Figure 3-1: European Designated Sites Screened into the Assessment of LSE within 15 km

Figure 4-1: European Designated Sites Screened into the Assessment of LSE

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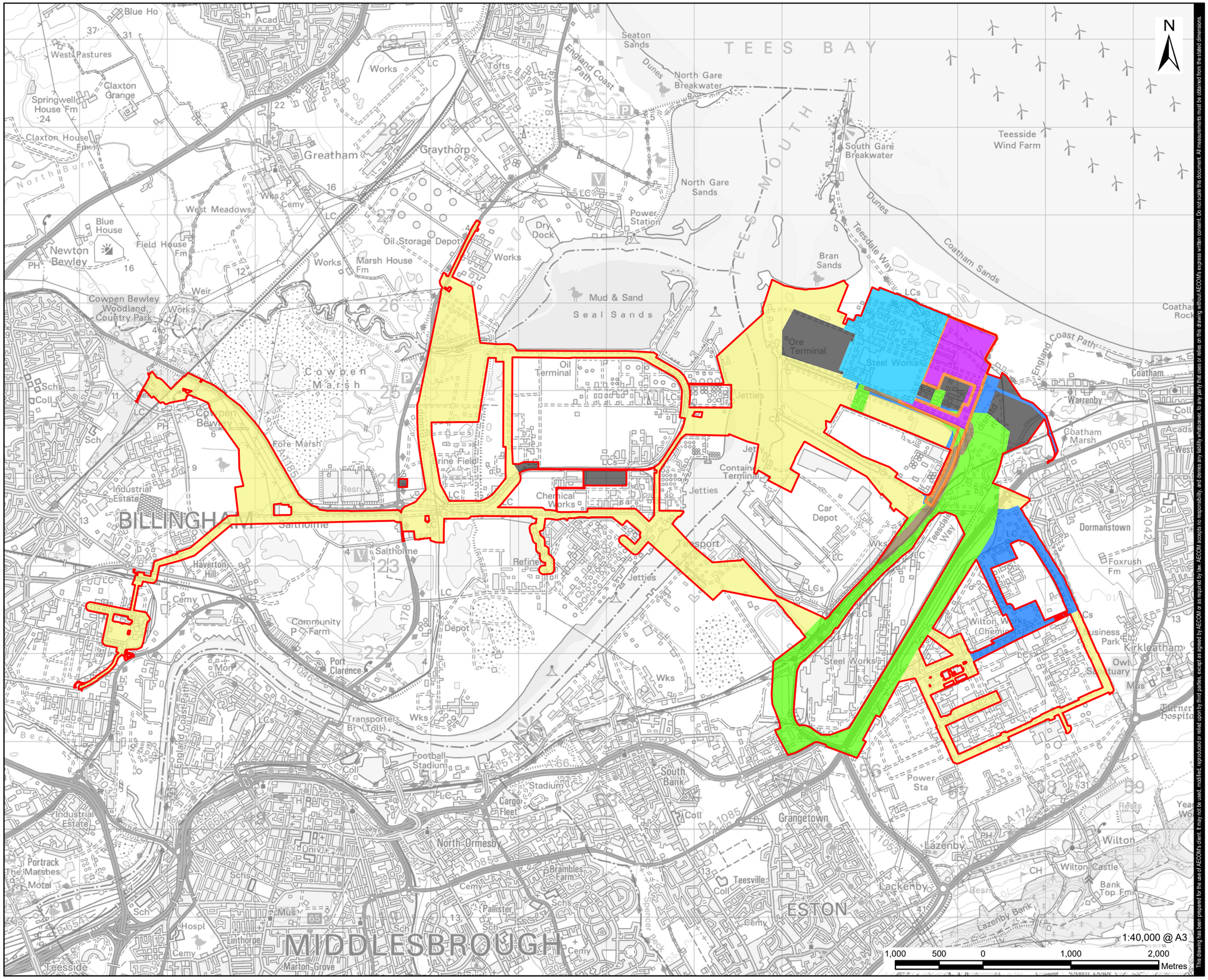

AECOM

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APPLICANT

H2 Teesside Limited

CONSULTANT

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LEGEND

- Proposed Development Site Boundary
- Main Site
- CO_2 Export Corridor
- Electrical Connection Corridor
- Hydrogen Pipeline Corridor
- Indicative Temporary Construction Laydown Areas
- Natural Gas Connection Corridor
- Other Gases Connection Corridor (O_2 and N_2)
- Water Connection Corridor

NOTES

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ISSUE PURPOSE

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PROJECT NUMBER

60689030

FIGURE TITLE

Proposed Development Site from PEI Report, Volume II

FIGURE NUMBER

Figure 1-1

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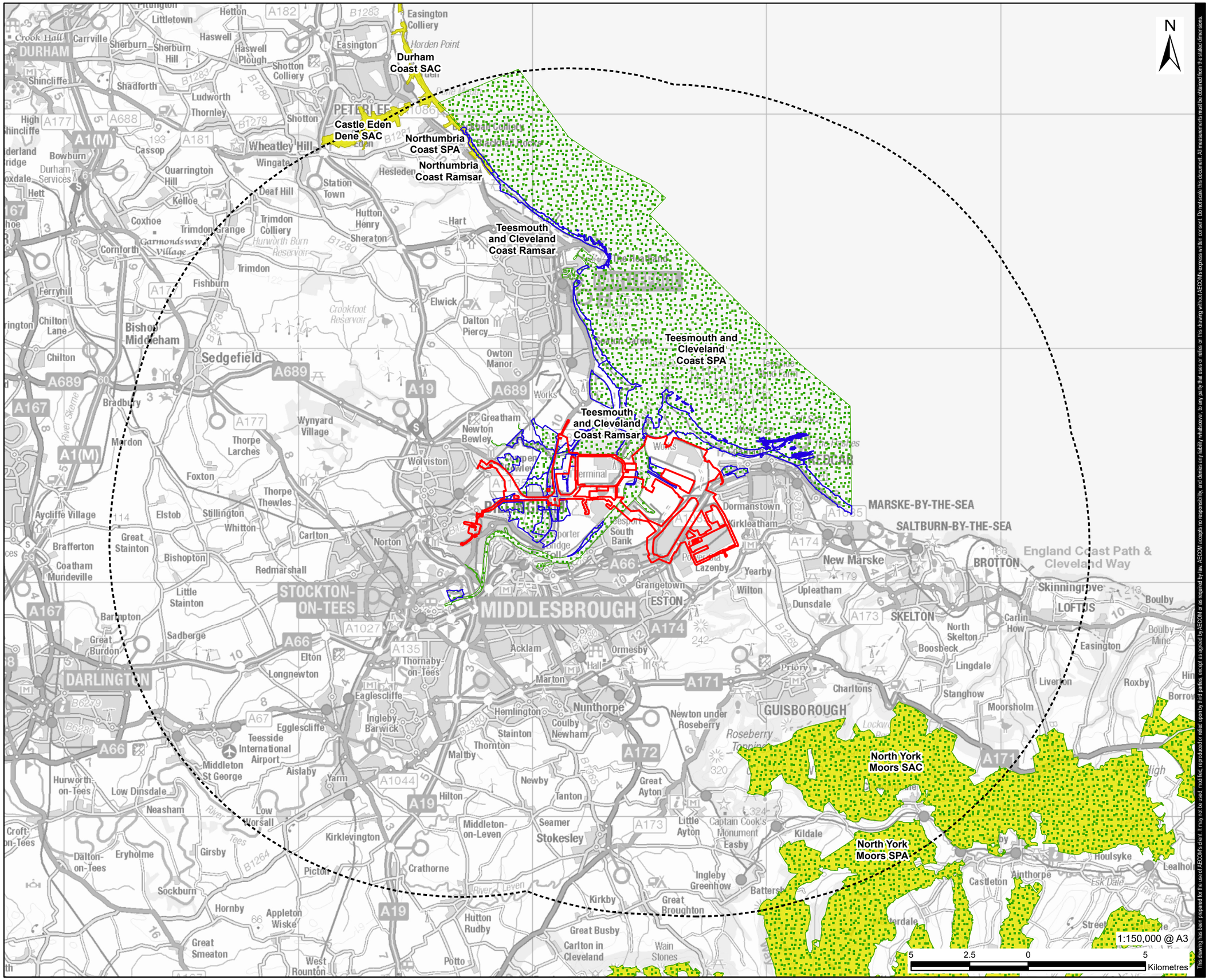

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LEGEND

- Proposed Development Site Boundary
- Proposed Development Site Boundary - 15 km Buffer
- Ramsar
- Special Areas of Conservation (SAC)
- Special Protection Area (SPA)

NOTES

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ISSUE PURPOSE

HRA

PROJECT NUMBER

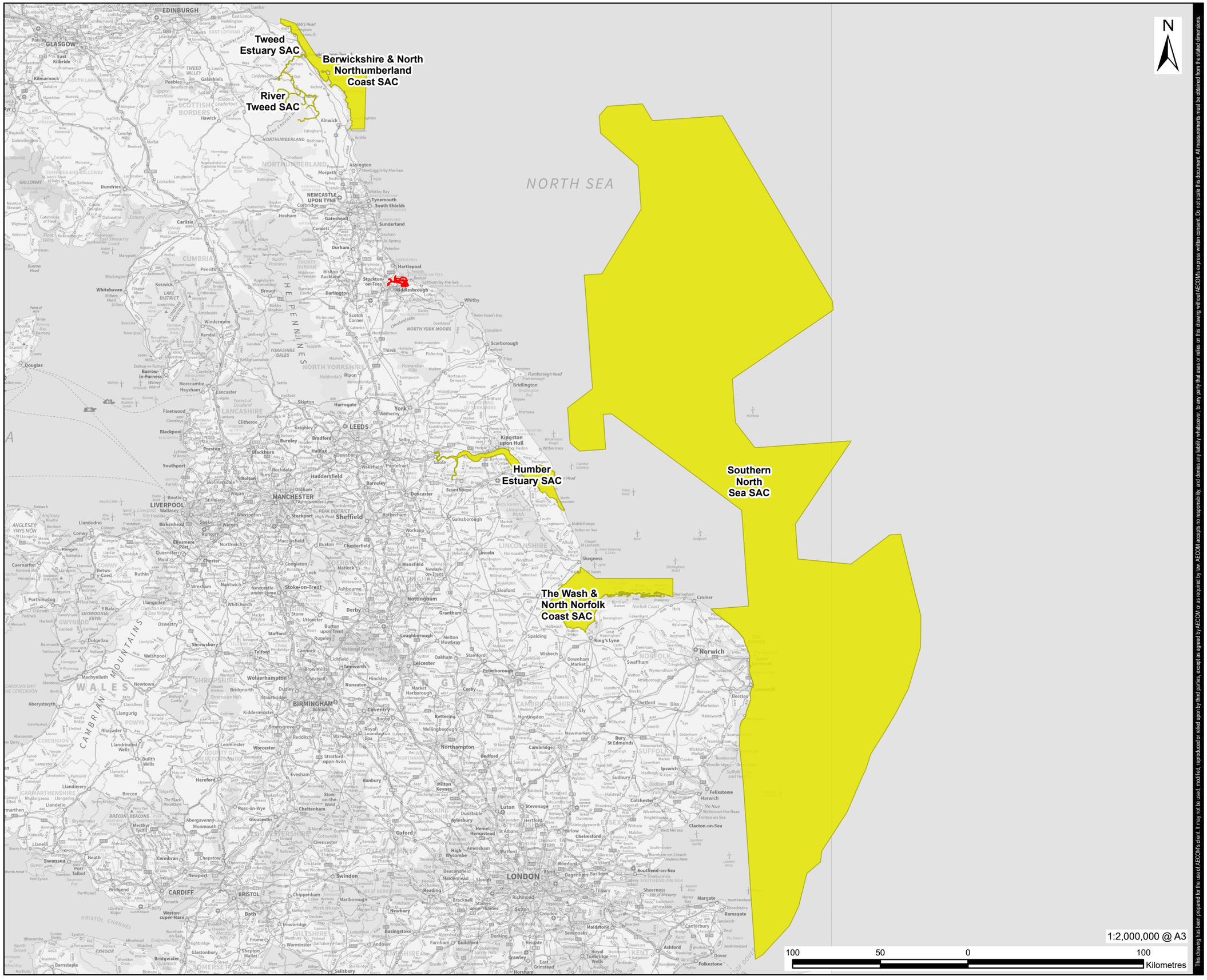
60689030

FIGURE TITLE

European Designated Sites Screened into the Assessment of LSE within 15 km

FIGURE NUMBER

Figure 3-1



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LEGEND

- Proposed Development Site Boundary
- Special Areas of Conservation (SAC)

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PROJECT NUMBER

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FIGURE TITLE

European Designated Sites Screened into the Assessment of LSE

FIGURE NUMBER

Figure 4-1

APPENDIX B: SUMMARY OF IMPACT PATHWAYS REFERRED TO IN THE DETAILED SCREENING MATRICES (APPENDIX C).

DESIGNATION	IMPACT PATHWAYS IDENTIFIED USING THE CURRENT EVIDENCE BASE.	PRESENTED IN SCREENING MATRICES AS
Teesmouth and Cleveland Coast SPA / Ramsar	Direct habitat loss during construction or decommissioning. Loss of Functionally linked land during construction, operation or decommissioning Visual and noise disturbance during construction, operation and decommissioning Atmospheric pollution during construction operation and decommissioning Changes in water quality during construction, operation and decommissioning Coastal squeeze upon completion of the project	Direct habitat loss Visual and noise disturbance Atmospheric pollution Water quality Coastal squeeze
North York Moors SAC	Atmospheric pollution during operation	Atmospheric pollution
North York Moors SPA	Atmospheric pollution during operation	Atmospheric pollution
Durham Coast SAC	Atmospheric pollution during operation	Atmospheric pollution
Northumbria Coast SPA / Ramsar	Atmospheric pollution during operation	Atmospheric pollution
Berwickshire and North Northumberland Coast SAC	Disturbance of functionally linked habitat during construction and decommissioning	Disturbance of functionally linked habitat
Southern North Sea SAC	Disturbance of functionally linked habitat during construction and decommissioning	Disturbance of functionally linked habitat

DESIGNATION	IMPACT PATHWAYS IDENTIFIED USING THE CURRENT EVIDENCE BASE.	PRESENTED IN SCREENING MATRICES AS
The Wash and North Norfolk Coast SAC	Disturbance of functionally linked habitat during construction and decommissioning	Disturbance of functionally linked habitat
Humber Estuary SAC	Disturbance of functionally linked habitat during construction and decommissioning	Disturbance of functionally linked habitat
River Tweed SAC	Disturbance of functionally linked habitat during construction and decommissioning	Disturbance of functionally linked habitat
Tweed Estuary SAC	Disturbance of functionally linked habitat during construction and decommissioning	Disturbance of functionally linked habitat
Castle Eden Dene SAC	Atmospheric pollution during operation	Atmospheric pollution

General matrix key:

✓ = Likely significant effect **cannot** be excluded

✗ = Likely significant effect **can** be excluded

C = Construction

O = Operation

D = Decommissioning

APPENDIX C: SCREENING MATRICES

Appendix C1: Detailed screening matrix assessing the qualifying features of the Teesmouth and Cleveland Coast SPA / Ramsar against the identified impact pathways during construction (C columns), operation (O columns) and decommissioning (D columns).

EFFECT	VISUAL AND NOISE DISTURBANCE			ATMOSPHERIC POLLUTION			WATER QUALITY			DIRECT HABITAT LOSS	COASTAL SQUEEZE	IN COMBINATION EFFECTS		
Stage of Proposed Development	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**D**	**C**	**O**	**C**	**O**	**D**
Little tern *Sterna albifrons*	✓a	✗b	✓a	✓c	✓e	✓c	✓f	✓f	✓f	✓g	✗h	✓i	✓i	✓i
Common tern *Sterna hirundo*	✓a	✗b	✓a	✓c	✓e	✓c	✓f	✓f	✓f	✓g	✗h	✓i	✓i	✓i
Sandwich tern *Sterna sandvicensis*	✓a	✗b	✓a	✗d	✗d	✗d	✓f	✓f	✓f	✓g	✗h	✓i	✓i	✓i
Pied avocet *Recurvirostra avosetta*	✓a	✗b	✓a	✓c	✓e	✓c	✓f	✓f	✓f	✓g	✗h	✓i	✓i	✓i
Knot *Calidris canutus*	✓a	✗b	✓a	✗d	✗d	✗d	✓f	✓f	✓f	✓g	✗h	✓i	✓i	✓i
Ruff *Calidris pugnax*	✓a	✗b	✓a	✗d	✗d	✗d	✓f	✓f	✓f	✓g	✗h	✓i	✓i	✓i
Redshank *Tringa totanus*	✓a	✗b	✓a	✗d	✗d	✗d	✓f	✓f	✓f	✓g	✗h	✓ i	✓ i	✓ i
Waterbird assemblage	✓a	✗b	✓a	✗d	✗d	✗d	✓f	✓f	✓f	✓g	✗h	✓ i	✓	✓ i

a. Paragraph 4.2.11 highlights that Likely Significant Effects of noise and visual disturbance on the SPA / Ramsar arising from construction for the Proposed Development cannot be excluded. Therefore, it is considered that appropriate assessment and mitigation measures will be required to avoid adverse effects on site integrity.

b. Paragraphs 4.3.2 highlights potential for adverse noise disturbance effects during the operation of the Proposed Development on the SPA / Ramsar. Noise modelling for the main site was not available at the time of writing. Therefore, based upon a precautionary approach, LSE on the Teesmouth and Cleveland Coast SPA / Ramsar from operational noise is screened into Appropriate Assessment.

c. Little tern, common tern and avocet are the main nesting qualifying species that APIS identifies as sensitive to atmospheric pollution. Modelling is still being undertaken. Therefore, likely significant effect cannot be dismissed at this stage.

d. The qualifying species marked d are not sensitive to atmospheric nitrogen deposition according to APIS (Paragraph 4.2.14). While sandwich tern are sensitive to atmospheric pollution in principle, the SPA/Ramsar population is wintering only and therefore not sensitive to nitrogen deposition from the Proposed Development.

e. Operational site traffic has been screened out from the assessment because the Proposed Development will only involve 172 2-way daily traffic movements. However, paragraph 4.3.8 shows that nitrogen deposition resulting from the stacks of the Proposed Development will be above 1% of the Critical Load threshold for relevant Teesmouth and Cleveland Coast SPA / Ramsar habitats at the closest areas of the SPA/Ramsar site surrounding the plant. The 1% Critical Load limit is typically used by Natural England and the Environment Agency to denote potential significant atmospheric pollution impacts which require further analysis. Therefore, likely significant effects on the SPA/Ramsar site cannot be dismissed and appropriate assessment is required. While sandwich tern is sensitive to atmospheric pollution in principle, the SPA / Ramsar population is wintering only and therefore not sensitive to nitrogen deposition from the Proposed Development.

f. The Teesmouth and Cleveland Coast SPA / Ramsar (and SPA / Ramsar) is sensitive to negative changes in the water quality during the construction period. Paragraph 4.2.52 highlights that this particularly applies to toxic surface runoff, which is an issue requiring further consideration. A study on the ecological impact of changing water quality in the pools of the SPA / Ramsar is ongoing. This impact pathway is screened in for Appropriate Assessment. Paragraphs 4.3.10 and 4.3.11 also identify that Likely Significant Effects during the operational period cannot be excluded.

g. Paragraph 4.2.1 to 4.2.3 discuss the construction of the project, Although the pipeline will be direct-drilled below the riverbed and the SPA/Ramsar and will therefore not result in the loss of habitat or any vibration of the water column, the Proposed Order Limits does overlap with the SPA; while it is expected that detailed routing design can avoid land take from the SPA, or ensure it is achieved by direct drilling, direct landtake cannot be screened out at this stage.

h. Paragraph 4.3.20 states that the Proposed Development lies on an existing brownfield site and therefore will not materially contribute to coastal squeeze. This impact pathway is screened out from Appropriate Assessment.

i. Paragraphs 5.1.3 to 5.1.5 identify plans and projects with the potential to act in combination with the Proposed Development. Since likely significant effects will arise from construction and decommissioning noise on all SPA/Ramsar features, from operational air quality impacts (on nesting terns and avocet only), and from construction and operational period water quality impacts on all SPA/Ramsar features, these will also operate in combination with other plans and projects. No ‘in combination’ coastal squeeze effect will occur as this impact pathway has been dismissed.

Appendix C2: Detailed screening matrix assessing the qualifying features of the North York Moors SAC against the identified impact pathway during operation (O column) and decommissioning (D column).

Name of European site and Designation: North York Moors SAC

EU Code: UK0030228		
Proximity to Main Site: 12.1 km		
Effect	**Atmospheric pollution**	**In Combination Effects**
Stage of Proposed Development	**O**	**O**
Northern Atlantic wet heaths with *Erica tetralix*	✓a	✓c
European dry heaths	✓a	✓c
Blanket bogs	✕b	✕d

a. Paragraph 4.3.9 indicates that air quality modelling is still being undertaken. Therefore, this impact pathway is screened in for Appropriate Assessment, where the updated modelling and process improvements will be taken into account.

b. Paragraph 4.3.6 also highlights that the operational nitrogen deposition from the main site would not result in a material increase in nitrogen deposition on the most sensitive qualifying habitat (blanket bog) of the SAC. Therefore, this impact pathway is screened out from Appropriate Assessment.

c. Since likely significant effects will arise from operational air quality impacts (on heathland only), these will also operate in combination with other plans and projects.

d. Since blanket bog is beyond the operational air quality zone of influence of the scheme no in combination effect will arise.

Appendix C3: Detailed screening matrix assessing the qualifying features of the North York Moors SPA against the identified impact pathway during operation (O column).

Name of European site and Designation: North York Moors SPA

EU Code: UK9006161		
Proximity to Main Site: 12.1 km		
Effect	**Atmospheric pollution**	**In Combination Effects**
Stage of Proposed Development	**O**	**O**
Merlin *Falco columbianus*	✓a	✓b
Golden plover *Pluvialis apricaria*	✓a	✓b

a. In the breeding season merlin mainly rely on dwarf shrub heath (identified as having a critical nitrogen load of 10-20 kg N/ha/yr on APIS) as may golden plover to a lesser extent. Air quality modelling is still being undertaken Therefore, this impact pathway is screened in for Appropriate Assessment where the updated modelling and process improvements will be taken into account.

b. Since likely significant effects will arise from operational air quality impacts on heathland only, these will also operate in combination with other plans and projects.

Appendix C4: Detailed screening matrix assessing the qualifying features of the Durham Coast SAC against the identified impact pathways during operation (O column).

Name of European site and Designation: Durham Coast SAC

EU Code: UK0030140		
Proximity to Main Site: 13.7 km		
Effect	**Atmospheric pollution**	**In Combination Effects**
Stage of Proposed Development	**O**	**O**
Vegetated sea cliffs of the Atlantic and Baltic Coasts	✕a	✕b

a. The qualifying feature of the Durham Coast SAC is not sensitive to atmospheric nitrogen or acid deposition. The site is therefore screened out from Appropriate Assessment.

b. Since the qualifying feature is not vulnerable to atmospheric pollution no in combination effect will arise

Appendix C5: Detailed screening matrix assessing the qualifying features of the Northumbria Coast SPA / Ramsar against the identified impact pathways during construction (C) and decommissioning(D).

Name of European site and Designation: Northumbria Coast SPA/Ramsar				
EU Code: UK9006131				
Proximity to Main Site: 7.6 km				
Effect	**Atmospheric pollution**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Purple sandpiper *Calidris maritima*	✕a	✕a	✕b	✕b
Ruddy turnstone *Arenaria interpres*	✕a	✕a	✕b	✕b
Little tern *Sterna albifrons*	✕a	✕a	✕b	✕b

a. Paragraph 4.2.48 details that the nesting little tern are the only qualifying feature of the Northumbria Coast SPA / Ramsar that is sensitive to atmospheric pollution. However, the tern nesting locations lie beyond the area affected by nitrogen deposition from the Proposed Development.

b. Since the only sensitive interest feature lies beyond the air quality impact zone of the Proposed Development no in combination effect will arise.

Appendix C6: Detailed screening matrix assessing the qualifying features of the Berwickshire and North Northumberland Coast SAC against the identified impact pathways during construction (C column) and decommissioning (D column).

Name of European site and Designation: Berwickshire & North Northumberland Coast SAC

EU Code: UK0017072				
Distance to Proposed Development: 87 km				
Effect	**Disturbance in functionally linked habitat**		**In Combination Effects**	**In Combination Effects**
Stage of Proposed Development	**C**	**D**	**C**	**D**
Mudflats and sandflats not covered by seawater at low tide	N/A	N/A	N/A	N/A
Large shallow inlets and bays	N/A	N/A	N/A	N/A
Reefs	N/A	N/A	N/A	N/A
Submerged or partially submerged sea caves	N/A	N/A	N/A	N/A

Grey seal *Halichoerus grypus*	✓a	✓a	✓b	✓b

a. Paragraph 4.2.32 discusses that grey seal use functionally linked habitat beyond designated site boundaries. Noise modelling is being completed at the time of writing, therefore based upon a precautionary approach, noise and visual disturbance of grey seals and harbour seals within functionally linked land (qualifying features of the Berwickshire and North Northumberland Coast SAC, the Humber Estuary SAC and the Wash and North Norfolk Coast SAC) are taken forward to Appropriate assessment.

b. Paragraphs 5.1.3 to 5.1.5 identify plans and projects with the potential to act in combination with the Proposed Development. Since likely significant effects may arise from construction and decommissioning there is the potential in combination effects will be considered in more detail at Appropriate Assessment.

Appendix C7: Detailed screening matrix assessing the qualifying features of the Humber Estuary SAC against the identified impact pathway during construction (C column) and decommissioning (D column).

Name of European site and Designation: Humber Estuary SAC

EU Code: UK0030170

Distance to Proposed Development: 110 km

Effect	**Disturbance of functionally linked habitat**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Estuaries	N/A	N/A	N/A	N/A
Mudflats and sandflats not covered by seawater at low tide	N/A	N/A	N/A	N/A
Sandbanks which are slightly covered by sea water all the time	N/A	N/A	N/A	N/A
Coastal lagoons	N/A	N/A	N/A	N/A

Name of European site and Designation: Humber Estuary SAC

EU Code: UK0030170

Distance to Proposed Development: 110 km

Effect	**Disturbance of functionally linked habitat**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Salicornia and other annuals colonizing mud and sand	N/A	N/A	N/A	N/A
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	N/A	N/A	N/A	N/A
Embryonic shifting dunes	N/A	N/A	N/A	N/A
Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”)	N/A	N/A	N/A	N/A

Name of European site and Designation: Humber Estuary SAC

EU Code: UK0030170

Distance to Proposed Development: 110 km

Effect	**Disturbance of functionally linked habitat**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Fixed coastal dunes with herbaceous vegetation ("grey dune")	N/A	N/A	N/A	N/A
Dunes with *Hippopha rhamnoides*	N/A	N/A	N/A	N/A
Sea lamprey *Petromyzon marinus*	✕a	✕a	✕d	✕d
River lamprey *Lampetra fluviatilis*	✕b	✕b	✕d	✕d
Grey seal *Halichoerus grypus*	✓c	✓c	✓d	✓d

a. Paragraph 4.2.45 addresses the potential of the Proposed Development to result in disturbance of migratory routes for fish. However, the proposals do not involve construction or operation activities in the marine environment that could affect the migratory fish. Therefore, this species is screened out from Appropriate Assessment.

b. While river lamprey might use functionally linked habitat beyond the designated site boundary, they are not migratory and there will not be Likely Significant Effects of the Proposed Development due to its long distance to the Humber Estuary SAC.

c. Paragraph 4.2.32 discusses that grey seal use functionally linked habitat beyond designated site boundaries. Noise modelling is being completed at the time of writing, therefore based upon a precautionary approach, noise and visual disturbance of grey seals will be taken forward to Appropriate Assessment.

d. Paragraphs 5.1.3 to 5.1.5 identify plans and projects with the potential to act in combination with the Proposed Development. Since likely significant effects may arise from construction and decommissioning there is the potential in combination effects will be considered in more detail at Appropriate Assessment.

Appendix C8: Detailed screening matrix assessing the qualifying features of the Southern North Sea SAC against the identified impact pathway during construction (C column) and decommissioning (D column).

Name of European site and Designation: Southern North Sea SAC				
EU Code: UK0030395				
Distance to Proposed Development: 102km				
Effect	**Disturbance in functionally linked habitat**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Harbour porpoise *Phocoena phocoena*	✕a	✕a	✕b	✕b

a. The Southern North Sea SAC, which is designated for harbour porpoise, is located over 100 km away from the Proposed Development Site. The Planning Inspectorate have agreed that effects upon the Southern North Sea SAC can be scoped out of the ES as there are no impact pathways from underwater sound arising from the proposals (The Planning Inspectorate, 2023). As such, LSE upon harbour porpoise is also screened out.

b. Since a likely significant effect will arise alone, it cannot be dismissed 'in-combination.'

Appendix C9: Detailed screening matrix assessing the qualifying features of The Wash and North Norfolk Coast SAC against the identified impact pathway during construction (C column) and decommissioning (D column).

Name of European site and Designation: The Wash and North Norfolk Coast SAC				
EU Code: UK0017075				
Distance to Proposed Development: 174 km				
Effect	**Disturbance in functionally linked habitat**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Sandbanks which are slightly covered by sea water all the time	N/A	N/A	N/A	N/A
Mudflats and sandflats not covered by seawater at low tide	N/A	N/A	N/A	N/A
Large shallow inlets and bays	N/A	N/A	N/A	N/A
Reefs	N/A	N/A	N/A	N/A

Name of European site and Designation: The Wash and North Norfolk Coast SAC				
EU Code: UK0017075				
Distance to Proposed Development: 174 km				
Effect	**Disturbance in functionally linked habitat**		**In Combination Effects**	
Salicornia and other annuals colonizing mud and sand	N/A	N/A	N/A	N/A
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	N/A	N/A	N/A	N/A
Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticose*)	N/A	N/A	N/A	N/A
Coastal lagoons	N/A	N/A	N/A	N/A
Harbour seal *Phoca vitulina*	✓a	✓a	✓c	✓c

Name of European site and Designation: The Wash and North Norfolk Coast SAC				
EU Code: UK0017075				
Distance to Proposed Development: 174 km				
Effect	**Disturbance in functionally linked habitat**		**In Combination Effects**	
Otter *Lutra lutra*	✕b	✕b	✕d	✕d

a. Paragraphs 4.2.26 to 4.2.31 discuss how harbour seal use functionally linked habitat beyond designated site boundaries. Noise modelling is being completed at the time of writing, therefore based upon a precautionary approach, noise and visual disturbance of harbour seals within functionally linked land is taken forward to Appropriate assessment.

b. While otter might use functionally linked habitat beyond the designated site boundary, there will not be Likely Significant Effects of the Proposed Development due to its long distance to The Wash and North Norfolk Coast SAC.

c. Paragraphs 5.1.3 to 5.1.5 identify plans and projects with the potential to act in combination with the Proposed Development. Since likely significant effects may arise from construction and decommissioning there is the potential in combination effects will be considered in more detail at Appropriate Assessment.

d. Since there is no impact pathway to affect the interest feature of the SAC no in combination effects will arise.

Appendix C10: Detailed screening matrix assessing the qualifying features of the River Tweed SAC against the identified impact pathway during construction (C column) and decommissioning (D column).

Name of European site and Designation: River Tweed SAC				
EU Code: UK0012691				
Distance to Proposed Development: 138 km				
Effect	**Disturbance in functionally linked habitat**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	N/A	N/A	N/A	N/A
Atlantic salmon *Salmo salar*	✓a	✓a	✓c	✓c

Name of European site and Designation: River Tweed SAC				
EU Code: UK0012691				
Distance to Proposed Development: 138 km				
Effect	**Disturbance in functionally linked habitat**		**In Combination Effects**	
Otter *Lutra lutra*	✕b	✕b	✕c	✕c
Sea lamprey *Petromyzon marinus*	✓a	✓a	✓c	✓c
Brook lamprey *Lampetra planeri*	✕b	✕b	✕c	✕c
River lamprey *Lampetra fluviatilis*	✕b	✕b	✕c	✕c

a. Paragraph 4.2.42 addresses the potential of the Proposed Development to result in disturbance of migratory routes for fish. The proposed connection routes will cross the River Tees and Greatham Creek, and there is potential for noise and vibration arising from construction to affect migratory fish. Therefore, based upon a precautionary approach, the potential for noise and vibration to affect sea lamprey will be taken forward to Appropriate Assessment.

b. While otter, brook lamprey and river lamprey might use functionally linked habitat beyond the designated site boundary, they are not migratory and there will not be Likely Significant Effects of the Proposed Development due to its long distance to the River Tweed SAC.

c. Since a likely significant effect will arise alone, it cannot be dismissed ‘in combination’.

Appendix C11: Detailed screening matrix assessing the qualifying features of the Tweed Estuary SAC against the identified impact pathways during construction (C column) and decommissioning (D column).

Name of European site and Designation: Tweed Estuary SAC				
EU Code: UK0030292				
Distance to Proposed Development: 137 km				
Effect	**Disturbance of functionally linked habitat**		**In Combination Effects**	
Stage of Proposed Development	**C**	**D**	**C**	**D**
Estuaries	N/A	N/A	N/A	N/A
Mudflats and sandflats not covered by seawater at low tide	N/A	N/A	N/A	N/A
Sea lamprey *Petromyzon marinus*	✓a	✓a	✓c	✓c
River lamprey *Lampetra fluviatilis*	✕b	✕b	✕c	✕c

a. Paragraph 4.2.42 addresses the potential of the Proposed Development to result in disturbance of migratory routes for fish. The proposed connection routes will cross the River Tees and Greatham Creek, and there is potential for noise and vibration arising from construction to affect migratory fish. Therefore, based upon a precautionary approach, the potential for noise and vibration to affect sea lamprey will be taken forward to Appropriate Assessment.

b. While river lamprey might use functionally linked habitat beyond the designated site boundary, they are not migratory and there will not be Likely Significant Effects of the Proposed Development due to its long distance to the Tweed Estuary SAC.

c. Since a likely significant effect will arise alone, it cannot be dismissed ‘in combination’.

Appendix C12: Detailed screening matrix assessing the qualifying features of the Castle Eden Dene SAC against the identified impact pathway during operation (O column)

Name of European site and Designation: Castle Eden Dene SAC

EU Code: UK0012768		
Distance to Proposed Development: 13.3 km		
Effect	**Atmospheric pollution**	**In Combination Effects**
Stage of Proposed Development	**O**	**O**
Yew woodland	✓a	✓c

a. Paragraph 4.3.9 indicates that air quality modelling is still being undertaken. Therefore, this impact pathway is screened in for Appropriate Assessment, where the updated modelling and process improvements will be taken into account.