

Preliminary Environmental Information Report

Volume III - Appendices

Appendix 15D: Habitat Regulations Assessment - Likely Significant Effects Screening Report

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







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15D. Habitat Regulations Assessment - Likely Significant Effects Report

15.1 Introduction

Overview

- 15.1.1 This Habitat Regulations Assessment Report Likely Significant Effects Assessment (HRA) has been prepared on behalf of Net Zero Teesside Power Ltd. & Net Zero North Sea Storage Ltd. (the 'Applicant'). It will ultimately form part of the application (the 'Application') for a Development Consent Order (a 'DCO'), that will be submitted to the Secretary of State (the 'SoS') for Business, Energy and Industrial Strategy, under Section 37 of 'The Planning Act 2008' (the 'PA 2008').
- 15.1.2 The Applicant is seeking development consent for the construction, operation and decommissioning of a Carbon Capture Utilisation and Storage (CCUS) project (hereafter referred to as the 'Proposed Development'), comprising a gas-fired Combined Cycle Gas Turbine (CCGT) plant together with the equipment required for the capture and compression of carbon dioxide (CO₂) emissions from the generating station. In addition, there is a need for the provision of supporting infrastructure and connections to facilitate the Proposed Development and to integrate it to a wider industrial carbon capture network in Teesside, the construction of which also forms part of this project. The project also includes high-pressure compression of CO₂ and export for off-shore storage. Captured CO₂ will be compressed and exported for offshore geological storage under the North Sea. Refer to Chapter 4: Proposed Development (PEI Report, Volume I) for full details of the proposal.
- 15.1.3 A DCO is required for the Proposed Development as it falls within the definition and thresholds for a 'Nationally Significant Infrastructure Project' (a 'NSIP') under Sections 14 and 15(2) of the PA 2008.
- 15.1.4 A Preliminary Environmental Information (PEI) Report is being produced in advance of assembling the Application. This version of the HRA report is therefore a preliminary document that discusses potential significant effects on internationally important wildlife sites to the extent possible at this stage of scheme development. As such, a provisional conclusion of Likely Significant Effects is made for a number of impact pathways, pending further technical and environmental analysis and ongoing stakeholder engagement that will inform the Application. As such, an updated version of this draft HRA, including both an updated Likely Significant Effects analysis (if required) and an Appropriate Assessment, will be produced to accompany the formal Application.





The Proposed Development

- 15.1.5 The location of the Proposed Development is on the east coast of England to the south of Hartlepool in an area that has been greatly modified by human development. It will lie on an existing brownfield site containing steel works and a sewage treatment plant. Geographically, the Proposed Development lies between Hartlepool and Middlesbrough, where the River Tees meets the North Sea. The Proposed Development site is located entirely within the boundary of the administrative unitary authorities of Redcar and Cleveland, and Stockton-on-Tees.
- 15.1.6 Notably for the purposes of HRA, the Proposed Development site lies directly adjacent to the Teesmouth and Cleveland Coast Special Protection Area (SPA) / Ramsar, which is designated both for breeding birds (little tern, avocet and common tern) and non-breeding birds (the overall non-breeding assemblage, particularly knot, ruff, redshank and Sandwich tern), which visit the SPA between autumn and spring.
- 15.1.7 In July 2018, Natural England launched a formal consultation on proposed extensions to The Teesmouth and Cleveland Coast SPA and Ramsar sites. Following consultation, these extensions were classified on the 16th January 2020. The SPA and Ramsar are now inclusive of areas such as the dunes and pools immediately north-east of the Power, Capture and Compression (PCC) Site. These areas have been included in the designation because overwintering birds use the pools for roosting, loafing and foraging; they are therefore essential to maintaining the integrity of the SPA / Ramsar and aquatic habitats will be considered for this reason.
- 15.1.8 Within the wider region there are also several estuarine and marine sites (e.g. the Humber Estuary Special Area of Conservation (SAC) and the Southern North Sea SAC) that require consideration due to their mobile species, which may use functionally linked habitats beyond the designated site boundaries. The term 'functional linkage' refers to the role or 'function' that land or sea beyond the boundary of a European site might fulfil in terms of ecologically supporting the populations for which the site was designated or classified. Such habitat is therefore 'linked' to the European site in question because it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status¹.
- 15.1.9 For reference, a detailed description of the location of the Proposed Development in relation to relevant European sites (i.e. SACs, SPAs and Ramsar site, including sites going through the designation process) is also provided in Chapter 3: Description of the Existing Environment (PEI Report, Volume I).
- 15.1.10 The Proposed Development will comprise the following main components and features (for a detailed description of the specifications of this project, please see Chapter 4: Proposed Development (PEI Report, Volume I):



¹ Description taken from Chapman, C. & Tyldesley, D. 2016. Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects - a review of authoritative decisions. Natural England Commissioned Reports, Number 207. Available at: http://publications.naturalengland.org.uk/publication/6087702630891520



- A New Build low carbon (clean) gas-fired power station with integrated carbon capture unit, low pressure compression and associated utilities and buildings located on part of the former Redcar Steelworks Site (Power and Capture Site);
- High pressure CO₂ export pipeline (CO₂ Export Pipeline);
- High Pressure CO₂ Compression facilities (HP Compressor Station);
- Gaseous Phase CO₂ Gathering Network connecting various industrial installations across the Tees Valley (CO₂ Gathering Network);
- Natural gas pipeline to supply the power station to support the clean power development (**Gas Connection Corridor**);
- Power export lines from the power station to the national transmission system to support the clean power development (Electrical Connection Corridor); and
- Water Connection Corridors including:
 - A connection corridor to Northumbrian Water Ltd, for the provision of water for the Proposed Development (Freshwater Connection Corridor);
 - An intake within the River Tees, which would be utilised in the event that the Northumbrian Water Ltd connection is not available or there is insufficient capacity, for provision of water for the Proposed Development (Water Abstraction Corridor); and
 - Disposal of treated effluent to Tees Bay subject to Environment Agency Permitting requirements (Water Discharge Corridor).
- The Power, Capture and Compression facilities together are termed the PCC in this PEI Report.
- 15.1.11 This HRA report will be augmented for the Application by an Appropriate Assessment forming the second part of the HRA. The purpose of this first HRA component is to establish whether there is a potential for Likely Significant Effects (LSEs) on nearby European sites that may arise from the Proposed Development, either alone or 'in combination' with other plans or projects. Please note that this assessment of LSEs has been conducted without taking proposed mitigation measures into account.

Legislative Context

- 15.1.12 Further to the Habitats Directive (European Council Directive 92/43/EEC) and the Birds Directive (European Council Directive 2009/147/EEC), as part of the assessment of a proposed scheme it is necessary to consider whether the scheme is likely to have a significant effect on areas that have been designated for nature conservation purposes (i.e. 'Natura 2000 Sites'). This 'first stage' is the assessment that has been conducted and reported in this document.
- 15.1.13 Should it be found that significant effects are likely, an 'Appropriate Assessment' should then be carried out in order to further assess those effects. Diagram 15D-1 sets out the legislative basis for an Appropriate





Assessment. Consent may only be given for the proposed scheme if, following assessment, it is established that it will not adversely affect the integrity of the designated site.

- 15.1.14 If adverse effects are identified, alternatives should be considered to avoid those effects. However, where no alternative solution exists and so an adverse effect remains, a further assessment should be made of whether the scheme is required for imperative reasons of overriding public interest (IROPI). If the scheme meets that IROPI test, compensatory measures will be required in order to maintain the overall Natura 2000 status.
- 15.1.15 The Habitats Directive is implemented in English and Welsh law by the Conservation of Habitats and Species Regulations 2017 (as amended) (the 2017 Regulations). One of the aims of the 2017 Regulations is to "maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest" (Article 2(2)). This aim therefore relates to habitats and species, not the European Sites themselves, although the European Sites have a role in delivering favourable conservation status.
- 15.1.16 The 2017 Regulations also apply the precautionary principle² to European Sites.
- 15.1.17 Over the years, the phrase 'Habitats Regulations Assessment' (HRA) has come into wide currency to describe the overall process set out in the 2017 Regulations, from the screening for Likely Significant Effects through to identification of IROPI. This has arisen in order to distinguish the overall process from the individual stage of "Appropriate Assessment". Throughout this Report the term HRA is used for the overall process and restricts the use of Appropriate Assessment to the specific stage of that name.

Conservation of Habitats and Species Regulations 2017 (as amended)

Regulation 63 of the 2017 Regulations states that:

"A competent authority, before deciding to ... give any consent for a plan or project which is likely to have a significant effect on a European site ... must make an appropriate assessment of the implications for the plan or project in view of that site's conservation objectives... The competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site."

Diagram 15D-1: The Legislative Basis for Appropriate Assessment



² The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as: *"When human activities may lead to morally unacceptable harm [to the environment] that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis".*



15.2 Methodology

Introduction

- 15.2.1 The HRA has been carried out with reference to the general EC guidance on HRA (European Commission, 2001), general guidance on HRA published by the UK government in July 2019 (Ministry of Housing, Communities & Local Government, 2019) and Planning Inspectorate (PINS) Advice Note 10 (The Planning Inspectorate, 2017).
- 15.2.2 The UK left the EU on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 ("the Withdrawal Act"). This established a transition period, which is currently set to end on 31 December 2020, although it can be extended once by either one or two years if both the UK and EU agree to an extension by 1 July 2020. The Withdrawal Act also retains the body of existing EU-derived law within our domestic law. During the transition period EU law applies to and in the UK.
- 15.2.3 As such this assessment of LSEs takes account of relevant EU case law (for instance, the Holohan and People over Wind cases, discussed below).
- 15.2.4 Diagram 15D-2 below outlines the stages of HRA according to PINS Advice Note 10. Note that while Diagram 15D-2 shows all the stages of the HRA process, this document only discusses stage 1 in further detail (see below). The stage 2 Appropriate Assessment will be documented as part of the Application.
- 15.2.5 Whilst the HRA decisions must be taken by the competent authority (The Planning Inspectorate as Examining 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.

HRA Stage 1 – Screening for Likely Significant Effects

- 15.2.6 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 Appropriate Assessment. The assessment must consider the potential for effects 'in combination' with other plans and projects.
- 15.2.7 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). 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 screening stage, but they can be taken into account in an Appropriate Assessment.



Diagram 15D-2: Four Stage Approach to Habitats Regulations Assessments of Projects.

The Rochdale Envelope

15.2.8 In July 2018, the Planning 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.





15.2.9 The Rochdale Envelope³ 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.

15.2.10 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
- 15.2.11 This HRA has given due consideration to the Rochdale Envelope in the screening process for Likely Significant Effects. The worst-case (i.e. the potentially most impactful) construction and operational scenarios have been assessed in relation to impact pathways. Furthermore, the section on hydrological impacts in the dune system assumes that the CO₂ pipeline will be put into place using an open-cut trench.

15.3 Baseline Evidence Gathering

Scope of the Project

- 15.3.1 There is no guidance that dictates the general physical scope of a HRA. Therefore, in considering the physical scope of the assessment, guidance was primarily provided by the identified impact pathways (called the sourcepathway-receptor model).
- 15.3.2 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 work or operational phase associated with a project. 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 informed by the best available evidence.

Relevant European sites

15.3.3 Guidance published by the Environment Agency (Environment Agency, 2016) recommends that for large power generation developments greater than 50 Megawatt, a radius of search of 15 km should be used when identifying relevant European designated sites which may be affected by the development. The search radius has also been informed by pre-application



³ 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.



engagement discussions with Natural England which have been underway since 2017, as summarised below:

- July 2017 (Pre-Application engagement meeting);
- September 2017 (Methodology and scope review);
- March 2019 (Pre-Application engagement meeting);
- April 2019 (Pre-Application engagement meeting); and
- February 2020 (Pre-Application engagement meeting).
- 15.3.4 The following European sites were identified within a 15 km radius of the Proposed Development:
 - the Teesmouth and Cleveland Coast SPA / Ramsar;
 - North York Moors SAC;
 - Durham Coast SAC; and
 - Northumbria Coast SPA and Ramsar.
- 15.3.5 Therefore, these are the European sites covered by the air quality impact assessment and discussed in the part of this HRA dealing with that pathway.
- 15.3.6 In addition to air quality, there are several other impact pathways identified to the Teesmouth and Cleveland Coast SPA/Ramsar site such as construction and operational disturbance, direct temporary habitat impact and water quality and hydrological impacts. This European site is therefore the focus of the assessment.
- 15.3.7 Some impact pathways to transient populations, disruption of fish migration for example, can affect sites considerably further afield than 15 km. As a precaution, potential impact pathways to relevant European sites designated marine mammals and migratory fish are therefore also considered in this HRA.
- 15.3.8 Given the location of the Proposed Development, the relevant European sites and the likely impact pathways present, this HRA needs to discuss the following European sites:
 - Teesmouth and Cleveland Coast SPA / Ramsar;
 - Durham Coast SAC;
 - North York Moors SAC;
 - North York Moors SPA;
 - Berwickshire and North Northumberland Coast SAC;
 - Northumbria Coast SPA / Ramsar;
 - The Wash and North Norfolk Coast SAC;
 - Humber Estuary SAC;
 - Southern North Sea SAC;





- River Tweed SAC; and
- Tweed Estuary SAC
- 15.3.9 It is to be noted that some of the European sites included above lie at considerable distances from the Proposed Development. Some sites are designated for marine mammals (Berwickshire and North Northumberland Coast SAC, the Wash and North Norfolk SAC, the Humber Estuary SAC and the Southern North Sea SAC) or migratory fish (River Tweed SAC and Tweed Estuary SAC). These qualifying species range great distances, potentially using the waters around the Proposed Development. The North York Moors SAC / SPA and Northumbria Coast SPA / Ramsar is considered in the context of operational stack emissions from the operational power plant, which have the potential to affect European sites that lie relatively far from industrial developments. Therefore, the above sites have been screened in for Appropriate Assessment.
- 15.3.10 The Teesmouth and Cleveland Coast Wetland of International Importance (a Ramsar site), which is largely contiguous with the Teesmouth and Cleveland Coast SPA, must be considered in this HRA assessment. Although Ramsar sites are not part of the Natura 2000 network of designated sites, paragraph 176 of the National Planning Policy Framework (NPPF) in England extends Ramsar sites the same level of protection as SPAs and SACs.
- 15.3.11 An introduction to and a summary of the qualifying features, conservation objectives and threats / pressures to site integrity of the Teesmouth and Cleveland Coast SPA / Ramsar (and its extension), and the European sites designated for marine mammals and migratory fish, is provided in the following section. The location of these sites in relation to the Proposed Development is illustrated in Figure 11-1 for Chapter 11: Noise and Vibration (PEI Report, Volume II).
- 15.3.12 Paragraph 4.9 of PINS Advice Note Ten requires an evaluation of the potential for the Scheme Project to require other consents which could also require Habitats Regulations Assessment by different competent authorities, and a statement as to whether the Scheme boundary overlaps with devolved administrations or other European Economic Area (EEA) States. The HRA that accompanies the Application will therefore include a discussion of the 'in combination' effects of the export pipeline which is subject to a separate consenting regime. It is confirmed that the Scheme boundary does not overlap with areas of devolved administrations or with those of other EEA States.

Teesmouth and Cleveland Coast SPA / Ramsar

Introduction

15.3.13 The Teesmouth and Cleveland Coast SPA / Ramsar (JNCC, 2001a) is a 1,247.31 ha estuarine and coastal site located on the north-eastern coast of England. 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.

SPA Qualifying Features (JNCC, 2015a)

- 15.3.14 The site qualifies as a SPA under Article 4.1 of the Birds Directive (79/409/EEC) by supporting populations of the following features, as per the conservation objectives for the SPA updated in May 2020:
 - Recurvirostra avosetta; Pied avocet (Breeding)
 - *Calidris canutus*; Red knot (Non-breeding)
 - *Calidris pugnax;* Ruff (Non-breeding)
 - Tringa totanus; Common redshank (Non-breeding)
 - Sterna sandvicensis; Sandwich tern (Non-breeding)
 - Sterna hirundo; Common tern (Breeding)
 - Sterna albifrons; Little tern (Breeding)
 - Waterbird assemblage
- 15.3.15 A Technical Information Note (TIN) was prepared by Natural England in July 2015 regarding a potential extension to the Teesmouth and Cleveland Coast SPA / Ramsar (Natural England, 2015a). This was done to improve seabird protection within the SPA network. The following were the primary reasons for the proposed extension:
 - Protecting common tern *Sterna hirundo* and avocet *Recurvirostra avosetta* as new breeding qualifying features within the SPA;
 - Extending the boundary of the SPA into the marine environment to protect foraging opportunities for little tern *Sterna albifrons* and common tern; and
 - Including functionally linked terrestrial habitats that support breeding common tern and avocet, and non-breeding waterbirds.
- 15.3.16 The suggestion for a marine extension to the SPA was based on shorebased and boat-based surveys of marine waters surrounding the little tern colony at Crimdon Dene. Terns are central place foragers, which means they return to a central place (their nest) after each foraging trip. This means that there is a strong energetic incentive to forage as close to the nest as possible. Therefore, based on both survey and modelling data, NE recommended that the marine waters extending between 3.5 and 6 km from known tern colonies should be protected.
- 15.3.17 Natural England also reviewed Wetland Bird Survey core count data for breeding avocet and common tern, and non-breeding waterfowl in terrestrial habitats adjoining the SPA / Ramsar (as currently identified). This has shown that some terrestrial habitats (e.g. intertidal zones, dunes, wet grassland, reedbeds) are used by significant numbers of SPA / Ramsar birds. These areas have also been recommended for inclusion into the SPA / Ramsar and are treated in this HRA as if fully designated.





15.3.18 The extension was formally included within the SPA/Ramsar site in January 2020.

Ramsar Qualifying Features (RSIS, 2000a)

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

Criterion 5 - Assemblages of international importance

Species with peak counts in winter

9,528 waterfowl (5 year peak mean 1998/99-2002/03)

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 totanus*; 883 individuals representing an average of 0.7% of the GB population (5 year peak mean 1998/9-2002/3)

Species with peak counts in winter:

• Red knot *Calidris canutus islandica*; 2,579 individuals representing an average of 0.9% of the GB population (5 year peak mean 1987-1991)

SPA Conservation Objectives (Natural England, 2020a)

- 15.3.20 With regard to the SPA and the individual species and/or assemblage of species for which the site has been, or may be, classified (the 'Qualifying Features' including the 'Additional Qualifying Features' listed below), and subject to natural change (Natural England, 2020a); the conservation objectives are to:
- 15.3.21 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 / Pressures to Site Integrity (Natural England, 2014b)

15.3.22 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, 2014b):

- 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; and
- Air pollution: Impact of atmospheric nitrogen deposition.

North York Moors SAC

Introduction

- 15.3.23 The North York Moors SAC is a 44,053.29 ha 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.
- 15.3.24 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.
- 15.3.25 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 (JNCC, 2020a)

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, 2014c)

- 15.3.26 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:
- 15.3.27 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 / Pressures to Site Integrity (Natural England, 2014d)

- 15.3.28 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

15.3.29 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 (JNCC, 2001b) 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, 2014e)

- 15.3.30 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:
- 15.3.31 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

15.3.32 The following threats / pressures to the site integrity of the North York Moors SPA 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; and
- Wildfire / arson

Durham Coast SAC

Introduction

15.3.33 The Durham Coast SAC is a 389.61ha 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 20km.





15.3.34 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*.

Qualifying Features (JNCC, 2015b)

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

• Vegetated sea cliffs of the Atlantic and Baltic Coasts

Conservation Objectives (Natural England, 2014f)

- 15.3.35 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;
- 15.3.36 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

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

- 15.3.37 The following threats / pressures to the site integrity of the Durham Coast SAC have been identified in Natural England's Site Improvement Plan:
 - Natural changes to site conditions;
 - Inappropriate coastal management;
 - Invasive species;
 - Fertiliser use;
 - Vehicles: Illicit;
 - Changes to site conditions; and
 - Public access / disturbance

Northumbria Coast SPA / Ramsar

Introduction

15.3.38 The Northumberland 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.

15.3.39 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)

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

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

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)

15.3.40 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, 2014h)

- 15.3.41 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;
- 15.3.42 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)

15.3.43 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.

Berwickshire and North Northumberland Coast SAC

Introduction

- 15.3.44 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%).
- 15.3.45 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.
- 15.3.46 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.





15.3.47 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) 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.

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

• Grey seal Halichoerus grypus

Conservation Objectives (Natural England, 2014i)

- 15.3.48 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:
- 15.3.49 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)

- 15.3.50 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.

The Wash and North Norfolk Coast SAC

Introduction

- 15.3.51 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*.
- 15.3.52 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 infauna is sparser.
- 15.3.53 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)

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*).

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

Coastal lagoons

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





• Harbour seal Phoca vitulina

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

• Otter Lutra lutra

Conservation Objectives (Natural England, 2014j)

- 15.3.54 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:
- 15.3.55 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)

- 15.3.56 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.

Humber Estuary SAC

Introduction

- 15.3.57 The Humber Estuary SAC is a 36,657.15ha large estuarine site in northeastern 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%).
- 15.3.58 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.
- 15.3.59 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)

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.

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.

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)

- 15.3.60 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:
- 15.3.61 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)

- 15.3.62 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

- 15.3.63 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.
- 15.3.64 Harbour porpoise 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) Annex II species that are a primary reason for selection of this site:

• Harbour porpoise Phocoena phocoena

Conservation Objectives (JNCC and Natural England, 2019)

- 15.3.65 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

15.3.66 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

15.3.67 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)

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

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

- Atlantic salmon Salmo salar; and
- Otter Lutra lutra

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

- Sea lamprey Petromyzon marinus;
- Brook lamprey Lampetra planeri; and
- River lamprey Lampetra fluviatilis.

Conservation Objectives (Natural England, 2014I)

- 15.3.68 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:
- 15.3.69 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, 2014m)

- 15.3.70 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

- 15.3.71 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.
- 15.3.72 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)

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.

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

- Sea lamprey Petromyzon marinus; and
- River lamprey Lampetra fluviatilis.

Conservation Objectives (Natural England, 2014n)

- 15.3.73 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:
- 15.3.74 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)

15.3.75 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.

15.4 Test of Likely Significant Effects

- 15.4.1 This section examines the Likely Significant Effects of the Proposed Development. It is structured by development phase (i.e. first by construction period, then by operational period). Chapter 5: Construction Programme and Management (PEI Report, Volume I) identifies that the Proposed Development will not involve any demolition. This development phase is therefore not discussed and is excluded from the screening matrices.
- 15.4.2 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. The analysis is summarised in the screening matrices in Appendices 15-2 to 15-10.

Construction Period

Visual and noise disturbance

15.4.3 The Natural England Site Improvement Plan (SIP) for the Teesmouth and Cleveland Coast SPA / Ramsar (and its extension) highlights that the site is sensitive to public access and disturbance, primarily as a result of recreational users accessing the beach (Natural England, 2014b). 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 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.

- 15.4.4 A study on recreational disturbance in the Humber (Fearnley *et al.*, 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; Tempel & Gutierrez, 2003). 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 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).
- 15.4.5 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 pathway⁴. 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.
- 15.4.6 On other projects, Natural England have deemed the change in the noise levels experienced by birds, rather than an absolute noise threshold, as being more appropriate for impact assessment. Birds are considered to have similar hearing to humans. The smallest change in noise detectable as a change to the human ear is 3 dB. Such a small change, since it is only just perceptible, is very unlikely to be disturbing to birds for the same reason it is not disturbing to people. However, a change of 10 dB at the bird would effectively represent a doubling in the perceived loudness, due to the logarithmic nature of the decibel scale, and could well result in disturbance. These relationships primarily refer to sounds of a similar nature. A significant change in the nature of the sound will increase the perception of change and hence the potential disturbance. As such, it is important to gain an understanding of the baseline noise levels near ecological receptors and to put the noise levels arising from construction of the Proposed Development into context. Measurements at location E1 on Figure 11-1 for Chapter 11: Noise and Vibration (PEI Report, Volume II) are considered representative of the closest point of the Teesmouth and Cleveland Coast SPA / Ramsar to the site.



⁴ The University's research is available at the following link: <u>http://bailey.persona-pi.com/Public-Inquiries/M4%20-</u> <u>%20Revised/11.3.67.pdf</u>.



- 15.4.7 The Proposed Development will involve construction of the CCGT and carbon capture units in the PCC site and the construction of connections for gas, water and CO₂ transport. Importantly, the water discharge and CO₂ transport could be via pipes that would be open cut through the dune systems of the extension to the Teesmouth and Cleveland Coast SPA / Ramsar⁵. This European site harbours qualifying species throughout the entire year (breeding terns in summer and non-breeding waders in winter), and visual and noise disturbance associated with construction work is thus not a seasonal issue. It requires consideration throughout the entire year.
- 15.4.8 Given that the SPA / Ramsar is directly adjacent to the PCC Site, the water abstraction and discharge areas, and the gas connection corridors, it is likely that construction activities in any of these site areas will 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) without mitigation measures such as visual screens. It is also possible that noise disturbance may occur depending on the noise levels arising from the construction works in the SPA / Ramsar.
- 15.4.9 Regarding the nesting terns (potentially affected by construction during the summer), historic data on nest locations was consulted to assess whether the Proposed Development could result in visual or noise disturbance. The common tern's main breeding location is at Saltholme Reserve on the western side of the River Tees, approx. 4.7 km to the south-west of the PCC. Up to 2018, the main little tern colonies were at Crimdon Denemouth and South Gare, with smaller numbers at Seaton Snook, Seaton Sands and Coatham (the latter about 20 years ago). In 2019 all little tern breeding occurred at Seaton Carew (36-38 nesting pairs). Given that little terns change breeding locations from season to season, all these locations should be regarded as sensitive regarding the little tern's future reproductive success. However, the closest of these historic breeding locations is Coatham, which lies approx. 2.1 km to the east of the PCC site. The most recent breeding location at Seaton Carew lies even further away, well beyond the distance at which the noisiest type of construction works (sheet piling, see below) or visual stimuli are considered to be of concern. Therefore, visual and noise disturbance from construction works at the PCC will not result in Likely Significant Effects on any known historic breeding locations of common or little terns or interfere with the ability of the SPA to achieve its conservation objectives for these species. This specific pathway is screened out from Appropriate Assessment.
- 15.4.10 It is currently assumed that piling will be needed for the main foundations of the stack, HRSG and turbine hall, due to the anticipated ground conditions. Until piling is underway it is difficult to predict the piling techniques that will be needed, except that the least noisy method is typically employed where possible. It is considered that vibro-piling is the preferential method, but impact piling (which is much noisier) might be used where difficult ground is encountered. While the specific piling method to be used and the timeframe for such piling is not yet available, this HRA adopts the 'Rochdale Envelope'.



⁵ Possibilities for direct drilling under the dunes are being explored but for the purposes of a precautionary assessment it is assumed here that open cut trenching would be required



This is precautionary in that it uses the worst-case (i.e. the most impactful) methods and parameters for the assessment.

- 15.4.11 AECOM undertook winter daytime and night-time ambient sound measurements at ecological receptors near the Proposed Development. Of greatest relevance to this HRA was location E1, which was to the east of the PCC site near the pools of the SPA / Ramsar. AECOM then predicted noise levels and mapped noise contours for sheet piling in terms of both *L*_{AFmax} (describes the peak noise level) and *L*_{Aeq} (describes the average noise level over a given time period). Sheet piling is the potential construction activity that would be expected to result in the highest noise levels.
- 15.4.12 The baseline noise measurements for the site show that at location E1, SPA / Ramsar birds currently experience daytime noise levels of 81 dB *L*_{AFmax} and 56 dB *L*_{Aeq}. Full details of baseline noise monitoring is available in Chapter 11: Noise and Vibration (PEI Report, Volume I). These data indicate that the existing noise environment is variable: while average noise levels are not particularly high, high baseline peak noise levels exceeding 80 dB were recorded. This strongly suggests that birds in this area are exposed to (and thus likely to be habituated to) a variable noise environment with a significant impulsive sound element.
- 15.4.13 The noise predictions considered that impulsive sheet piling, the noisiest construction technique, results in noise levels of 145 dB L_{AFmax} and 133 dB L_{Aeq} at source. In the pools of the SPA / Ramsar 81 dB L_{AFmax} has been predicted as a result of the sheet piling. This is 1 dB less than the L_{AFmax} measured at E1 near these pools during the baseline noise measurements. Therefore, construction at the PCC Site will not result in material changes to the L_{AFmax} experienced by qualifying birds, although the L_{AFmax} produced by the piling will occur repeatedly during the piling period.
- 15.4.14 However, sheet piling is also predicted to produce an average level of 65 dB L_{Aeq} in the pools, compared to the ambient noise level of 56 dB L_{Aeq} . This is an increase in 9 dB L_{Aeq} compared to the existing conditions, which represents an approximate doubling of the perceived noise level and would last for the duration of piling. Chapter 5: Construction Programme and Management (PEI Report, Volume I) indicates that earthworks are to be carried out over a period of 6 months. As a worst case, in line with the Rochdale Envelope, it is therefore considered that sheet piling might be carried out for that entire period.
- 15.4.15 There are methods to mitigate such an increase in noise levels for works taking place outside the SPA / Ramsar boundary, but these cannot be taken into account when determining Likely Significant Effects. In the absence of mitigation, construction of the PCC site will result in a significant increase in the LAeq present in the vicinity of the pools of the Teesmouth and Cleveland Coast SPA / Ramsar. <u>Therefore, Likely Significant Effects of PCC site</u> <u>construction noise on non-breeding SPA / Ramsar birds cannot be excluded</u> <u>due to the possibility that the conservation objectives regarding the</u> <u>population or distribution of the qualifying features could be affected, and this impact pathway is screened in for Appropriate Assessment, at which point</u>





mitigation (which can reduce noise levels by up to 10 dB) will be taken into account.

- 15.4.16 The Proposed Development is likely to involve the construction of aboveground pipelines within the boundary of the Site. Based on this assumption, predictions of free-field noise levels for pipe stringing, bending and welding activities (as L_{Aeg} over a 12-hour period) were made. It is predicted that pipeline construction would result in an L_{Aea} of 78 dB and 70 dB at distances of 20 m and 50 m from the source respectively. This is considerably higher than the daytime L_{Aeq} of 56 dB measured at location E2 closest to Saltholme reserve and shown on Figure 11-1 for Chapter 11: Noise and Vibration (PEI Report, Volume II). Given that above-ground pipelines might be constructed to the west of the River Tees in Saltholme Reserve (within the SPA/Ramsar), this could result in a considerable increase in the noise experienced by breeding common tern (depending on if works occurred in this location during the breeding season). Therefore, Likely Significant Effects of noise disturbance from above-ground pipeline construction cannot be excluded due to the possibility that the conservation objectives regarding the population or distribution of the common tern gualifying features could be affected, and the site is screened in for Appropriate Assessment, at which point mitigation will be taken into account.
- 15.4.17 This impact pathway will be revisited when detail on the location of such pipelines is available.
- 15.4.18 Part of the CO₂ export pipeline connecting the PCC Site to the offshore CO₂ storage site forms part of this project (specifically, the section of pipeline from Mean Low Water Springs to the PCC Site). That section of pipeline will run directly through the dunes of the Teesmouth and Cleveland Coast SPA / Ramsar. It is likely that the pipeline will be put in place by combining trenchless technologies and open cut techniques (possibly using an open trench up to 35 m wide). Both methods are currently being reviewed to determine the technique with the lowest impacts on European sites. However, at this point, open cut trenching is assumed in line with Rochdale Envelope requirements.
- 15.4.19 The CO₂ pipeline will traverse parts of the Teesmouth and Cleveland Coast SPA / Ramsar. Given that human presence will be required within or very close to the SPA / Ramsar, Likely Significant Effects of the CO₂ pipeline construction cannot be excluded in relation to both noise and, particularly, visual disturbance, regardless of which construction method is used. The excavation and drilling activities associated with the construction of the pipeline are likely to be less noisy than other construction activities (e.g. sheet piling). <u>However, given that these techniques will be carried out within the SPA / Ramsar, disturbance of SPA/Ramsar birds due to pipeline installation within Coatham Dunes/Sands is screened in for Appropriate <u>Assessment due to the possibility that the conservation objectives regarding the population or distribution of the qualifying features could be affected</u> Mitigation measures such as seasonal restrictions on works will be required, but these are not taken into account at the screening stage of this HRA.</u>





- 15.4.20 It is known that large structures (e.g. tall buildings and bridges) might change the behaviour of birds by affecting their sight- and flightlines. This may result in displacement, which could increase their energy expenditure. 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 stacks for the Power and Capture plant could have a height of 90 m. The average building height for the frontage (calculated from all individual components) will be 8 m. In AECOM's professional judgment relatively narrow structures such as stacks will not materially affect bird movement patterns as they block a very limited area and the frontage already contains structures that mean direct sightlines from the foreshore inland do not exist to be disrupted. Therefore, it is concluded that the Proposed Development will not result in Likely Significant Effects on the SPA / Ramsar birds, and thus interfere with achievement of the conservation objectives for the SPA regarding disruption to the sight- and / or flightlines of SPA / Ramsar birds.
- 15.4.21 In summary, construction of the main buildings and infrastructure associated with the project, particularly the PCC Site and the CO₂ export pipeline is screened in for Appropriate Assessment due to the potential for disturbance of the non-breeding and breeding interest features of the Teesmouth & Cleveland Coast SPA/Ramsar as a result of the potential for works on Coatham Sands/Dunes to be undertaken during a sensitive period, the fact that some pipeline construction work will occur within Saltholme Reserve and the fact that the main construction site is immediately adjacent to Coatham Dunes/Sands.

Atmospheric pollution

15.4.22 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH₃) and sulphur dioxide (SO₂) and are summarised in





15.4.23 Table **15D-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 NH₃ are likely to increase the total nitrogen deposition to soils, potentially leading to deleterious knock-on 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.




Table 15D-1: Main Sources and Effects of Air Pollutants on Habitats and Species (CEH, 2016b)

Pollutant	Source	Effects on habitats and species
Sulphur Dioxide (SO ₂)	The main sources of SO_2 are electricity generation from coal and oil combustion, and industrial and domestic fuel combustion. However, total SO_2 emissions in the UK have decreased substantially since the 1980's. Another origin of sulphur dioxide is the shipping industry and high atmospheric concentrations of SO_2 have been documented in busy ports. In future years shipping is likely to become one of the most important contributors to SO_2 emissions in the UK.	Wet and dry deposition of SO_2 acidifies soils and freshwater and may alter the composition of plant and animal communities. The magnitude of effects depends on levels of deposition, the buffering capacity of soils and the sensitivity of impacted species. However, SO_2 background levels have fallen considerably since the 1970's and are now not regarded a threat to plant communities. For example, decreases in Sulphur dioxide concentrations have been linked to returning lichen species and improved tree health in London.
Acid deposition	Leads to acidification of soils and freshwater via atmospheric deposition of SO ₂ , NOx, ammonia and hydrochloric acid. Acid deposition from rain has declined by 85% in the last 20 years, which most of this contributed by lower sulphate levels. Although future trends in S emissions and subsequent deposition to terrestrial and aquatic ecosystems will continue to decline, increased N emissions may cancel out any gains produced by reduced S levels.	Gaseous precursors (e.g. SO ₂) can cause direct damage to sensitive vegetation, such as lichen, upon deposition. Can affect habitats and species through both wet (acid rain) and dry deposition. The effects of acidification include lowering of soil pH, leaf chlorosis, reduced decomposition rates, and compromised reproduction in birds / plants. Not all sites are equally susceptible to acidification. This varies depending on soil type, bed rock geology, weathering rate and buffering capacity. For example, sites with an underlying geology of granite, gneiss and quartz rich rocks tend to be more susceptible.
Ammonia (NH₃)	Ammonia is a reactive, soluble alkaline gas that is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but ammonia concentrations are directly related to the distribution of livestock. 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 (NO _x)	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	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/m ³ .





Pollutant	Source	Effects on habitats and species				
	other industrial and domestic combustion processes. In contrast to the steep decline in sulphur dioxide emissions, nitrogen oxides are falling slowly due to control strategies being offset by increasing numbers of vehicles.	Deposition of nitrogen compounds (nitrates (NO_3) , nitrogen dioxide (NO_2) and nitric acid (HNO_3)) contributes to the total nitrogen deposition and may lead to both soil and freshwater acidification. In addition, NO_x 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				
Ozone (O ₃)	A secondary pollutant generated by photochemical reactions involving NOx, volatile organic compounds (VOCs) and sunlight. These precursors are mainly released by the combustion of fossil fuels (as discussed above). Increasing anthropogenic emissions of ozone precursors in the UK have led to an increased number of days when ozone levels rise above 40 ppb ('episodes' or 'smog'). Reducing ozone pollution is believed to require action at international level to reduce levels of the precursors that form ozone.	Concentrations of O ₃ above 40 ppb can be toxic to both humans and wildlife and can affect buildings. High O ₃ concentrations are widely documented to cause damage to vegetation, including visible leaf damage, reduction in floral biomass, reduction in crop yield (e.g. cereal grains, tomato, potato), reduction in the number of flowers, decrease in forest production and altered species composition in semi-natural plant communities.				

- 15.4.24 Sulphur dioxide emissions overwhelmingly derive from coal and oil power stations and industrial processes that require the combustion of coal and oil, as well as (particularly on a local scale) shipping (CEH, 2016c).
- 15.4.25 The only pollutant likely to be associated with construction of the Proposed Development is NOx which will be primarily determined by the associated traffic movements (both relating to on-site and commuter traffic) and any diesel plant required for construction.
- 15.4.26 The Air Pollution Information System (APIS) forms the major source of information regarding the air quality impact pathway. It specifies a critical NOx concentration (critical threshold) for the protection of vegetation of 30





 μ gm⁻³In addition, ecological studies have determined 'critical loads'⁶ of atmospheric nitrogen deposition (that is, NOx combined with ammonia NH₃).

- 15.4.27 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 the 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.
- 15.4.28 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 is the nesting terns, for the reasons given above.
- 15.4.29 According to the Department of Transport's Guidance, beyond 200 m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant (Diagram 15D-3). 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.



Diagram 15D-3: Traffic Contribution to Concentrations of Pollutants at Different Distances from a Road (Department for Transport, 2016)

15.4.30 An initial 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 phase of the development. It is anticipated that based on other CCGT power stations, this will be between 600 and 1,200 two-way vehicle movements per day during the peak construction period. A Transport Assessment (TA) will be undertaken to determine the effects of the construction phase on the transport network, which will include a description of current and future baseline conditions (including link and junction flows),

⁷ This is intended to be modelled on the Breagh Gas Pipeline case study, which delivered innovative mitigation measures in relation to impacts on the South Gare and Coatham Sands SSSI.





calculate the construction traffic flows and the likely routes to be taken by site traffic and abnormal traffic loads. This is discussed further within Chapter 16: Traffic and Transportation (PEI Report, Volume I).

- 15.4.31 An Air Quality Impact Assessment (AQIA) has been carried out (see Appendix 8A: Construction (PEI Report, Volume III) to look at the effects of vehicular traffic associated with the site (e.g. construction vehicles and machinery and operational vehicles) on roadside air quality (namely within 200 m of major transport links into and within the site). This has been undertaken in accordance with Defra's Local Air Quality Management Technical Guidance (2009) and using the Highways Agency's Design Manual for Roads and Bridges (DMRB) screening model.
- 15.4.32 Of relevance to this HRA, review of the Affected Road Network (ARN) for the Proposed Development indicates that much of the traffic linking to the site will concentrate on the A1042 and the Trunk Road around Dormanstown, south-east of the Teesmouth and Cleveland Coast SPA / Ramsar. A component part of the SPA / Ramsar (Coatham Marsh) lies adjacent to the ARN, but APIS does not identify the designated species that will be using this part of the European site (i.e. the overwintering birds) as sensitive to nitrogen deposition or NOx effects on their broad habitat. There are also no known historic tern nesting sites within 200 m of the ARN. The closest little tern nesting site (dating from 20 years ago) is situated approx. 1 km to the east of the Proposed Development. Other tern nesting locations are considerably further away in Seaton (Snook, Sands, Carew) or Saltholme reserve. Given this evidence, it is concluded that construction traffic arising from the Proposed Development will not result in Likely Significant Effects on the nesting terns through NOx and nitrogen deposition. Therefore, atmospheric pollution to Teesmouth and Cleveland Coast SPA/Ramsar due to construction traffic is screened out from Appropriate Assessment as it will not affect the ability of the site to achieve its conservation objectives for these species.
- 15.4.33 In addition to nesting terns, the SPA is designated for 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 kgN/ha/yr). Total nitrogen deposition at the closest part of the SPA to the ARN is forecast to remain below this critical load even with the Proposed Development (being a maximum of c.11 kgN/ha/yr).
- 15.4.34 The construction phase may also result in emissions of NOx (leading to nitrogen deposition) from other sources, such as the use of diesel plant. However, Chapter 8: Air Quality (PEI Report, Volume I) identifies that, whilst the final construction design is still under consideration, the SPA/Ramsar is likely to be over 100 m from the nearest source of emissions associated with site plant and Non-Road Motorised Machinery (NRMM). Due to the phased nature of the construction works, site plant and NRMM will only be required to be operational at that nearest location for a limited duration over the overall construction period, and only operational on an 'as and when required' basis during that particular phase. Due to the limited number of site plant and NRMM anticipated to be in use on the works section of the site





closest to the SPA/Ramsar, the limited number and intermittent hours of operation, and the setback distance between them and the SPA/Ramsar, it is considered that any impact experienced on the SPA/Ramsar as a result of site plant and NRMM emissions is likely to be negligible and not significant. As such construction-period atmospheric pollution to Teesmouth and Cleveland Coast SPA/Ramsar due to NRMM is screened out of Appropriate Assessment as it will not interfere with the ability of the site to achieve its conservation objectives.

15.4.35 In summary, atmospheric pollution during construction is screened out of the HRA and does not require Appropriate Assessment due to the fact that most of the interest features of the Teesmouth & Cleveland Coast SPA/Ramsar (except for nesting tern and avocet) are not sensitive to the relevant pollutants, the roads affected by construction traffic do not lie close enough to European sites to affect the interest features and the NRMM will not materially affect pollution exposure.

Water quality

- 15.4.36 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.
- 15.4.37 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.
- 15.4.38 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 the 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).

- 15.4.39 The Teesmouth and Cleveland Coast SPA / Ramsar is designated for its breeding tern 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, 2014b). 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.
- 15.4.40 To establish the ecological baseline communities, a Phase 1 study and initial macrofaunal sampling was undertaken in sites relevant to the Proposed Development. These included Coatham Sands and Bran Sands, which are 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. While none of the species of the infaunal community are gualifying 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.
- 15.4.41 It is considered that toxic contamination of European sites during the construction phase is an issue that requires further consideration, particularly regarding the pools of the SPA / Ramsar adjoining the PCC site. Other components (e.g. the gas connection corridor across the SPA / Ramsar part of the River Tees), will also involve construction activities adjacent to the SPA / Ramsar. Given the short distances involved, there is a high potential for toxic runoff and leachate reaching sensitive ecological receptors. It is noted that an assessment of changing water quality impacts on the ecological communities in the pools of the SPA / Ramsar is ongoing. Furthermore, key parameters are being measured to establish a baseline for the water quality in the European sites surrounding the Proposed Development. Until further data on the existing baseline conditions and the potential ecological impacts of the Proposed Development are available, 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 the supporting processes on which the qualifying features of the SPA/Ramsar rely.





- 15.4.42 During the construction phase of the Proposed Development, non-toxic wastewater will be primarily produced by toilets for construction staff. This will be extracted, transported and processed off-site. Therefore, it is concluded that organic pollution from sewage effluent is not an issue for the construction period. <u>Construction 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.</u>
- 15.4.43 In summary, the Proposed Development is screened in for Appropriate Assessment due to potential water quality impacts during construction 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.

Direct temporary habitat impact

- 15.4.44 The transport pipeline that will deliver the compressed CO₂ to the offshore storage site will traverse the dune system of the Teesmouth and Cleveland Coast SPA / Ramsar and the intertidal habitats of the SPA / Ramsar. As highlighted in Chapter 5: Construction Programme and Management (PEI Report, Volume I), both open-cut and trenchless technologies are being considered for the construction of the pipeline. Notwithstanding the method used, the construction process will result in the temporary impact on habitat in these European sites, until construction is complete, and the habitat is restored.
- 15.4.45 If an open-cut method were to be used, this would require a corridor width of 36 m and overburden excavation to a depth of 1.2 m below ground level. This method would involve significant reworking of the sediment, an access route along the trench and construction staff to weld sections of pipe together in-situ. Both the trench and the presence of site staff would result in potential direct temporary habitat impact, as well as visual and noise disturbance in areas of the European site that lie further away. While a technique using trenchless technologies is likely to be less impactful, it will still require a launch site and construction staff adjacent to the SPA / Ramsar.
- 15.4.46 Due to the potential negative impacts of the proposed pipeline construction, the methodology for the construction works is being refined. The work is likely to include a mitigation strategy to temporarily relocate and subsequently replant Marram grass and key perennial species, as well as contouring the post-construction dune landscape to its pre-construction state, which has been shown to be effective with other successful restoration schemes⁷ (see further details in paragraph below).
- 15.4.47 Regarding the ecological importance of Coatham Sands (which form part of the SPA's / Ramsar's dune and pool systems) there is an ongoing consultation with Natural England. It is understood that the habitat management measures (e.g. utilising techniques, planting) used in relation to a previous project (the Breagh Gas Pipeline) are to be used as a guide for the works carried out in Coatham Sands for the Proposed Development. To



⁷ This is intended to be modelled on the Breagh Gas Pipeline case study, which delivered innovative mitigation measures in relation to impacts on the South Gare and Coatham Sands SSSI.



minimise any potential adverse impacts on the SPA / Ramsar, a detailed survey of the different compartments of the pools and their hydrology will be undertaken in summer 2020. This is to inform a detailed habitat management plan for the works. However, these measures cannot be taken into account at the Likely Significant Effects stage.

- 15.4.48 Therefore, due to the nature of the works in the dune and pool systems of the SPA / Ramsar, this impact pathway is screened in for Appropriate Assessment as potential for effects on the extent and distribution of the habitats for qualifying features of the SPA may arise which would interfere with at least one of the conservation objectives. <u>This initial precautionary</u> <u>conclusion is reached before taking into consideration site-specific mitigation</u> <u>and habitat management measures (an appropriate approach at the PEI stage). As above, site-specific mitigation is being developed in consultation with Natural England and other stakeholders, as required. This will be provided in the ES submitted with the DCO application.</u>
- 15.4.49 The connection to the National Grid Gas (NGG) network will involve the construction of a gas pipeline under the River Tees, which is part of the SPA / Ramsar. Chapter 5: Construction Programme and Management (PEI Report, Volume I) highlights that this pipeline will be directionally drilled. The River Tees is included in the SPA / Ramsar due to its function as foraging habitat for terns. The installation of the gas pipeline below the riverbed will not affect the ability of the terns (which are plunge diving species) to forage in the water column. Therefore, the installation of the gas pipeline will not result in Likely Significant Effects on the Teesmouth and Cleveland Coast SPA / Ramsar through habitat impacts since it will not interfere with the extent and distribution of the habitats for the qualifying features, and this impact pathway is screened out from Appropriate Assessment.
- 15.4.50 In summary, the Proposed Development is screened in for Appropriate Assessment due to the potential for direct temporary habitat impact resulting from the construction of the CO₂ export pipeline through the Teesmouth and Cleveland Coast SPA / Ramsar may affect the <u>extent</u> <u>and distribution of the habitats for qualifying features of the SPA which</u> <u>would interfere with at least one of the conservation objectives.</u>

Hydrological impacts

- 15.4.51 The Teesmouth and Cleveland Coast SPA / Ramsar is designated for overwintering and migrating wetland bird species that rely on safe habitats for roosting, resting and foraging to recharge their depleted energy reserves for the long migration routes that lie ahead. Importantly, the recent extension to the SPA / Ramsar comprises a system of pools that SPA / Ramsar birds use for foraging and to rest in out of the open water.
- 15.4.52 All wetland habitats, such the ones present in RSPB Saltholme and the pools in the Teesmouth and Cleveland Coast SPA / Ramsar, rely on hydrological connections with other surface waters, such as rivers, streams, lakes or the sea. A constant supply of water within naturally fluctuating regimes is fundamental to maintaining the ecological integrity of most such sites. However, while the natural fluctuation of water levels is desirable,





excess or too little water supply might cause the water level to be outside of the required range of SPA / Ramsar birds and / or their prey.

- 15.4.53 Specifically, the Site Improvement Plan for the Teesmouth and Cleveland Coast SPA / Ramsar (Natural England, 2014b) identifies inappropriate water levels as a concern for the SPA / Ramsar. It states that the wetland habitats at RSPB Saltholme support a significant proportion of the site's non-breeding waterbirds but are reliant on a water supply from industrial sources, which may not be sustainable in the long-term.
- 15.4.54 Requirements for specific water levels are species- and life cycle-specific. For example, terns require relatively deep pools or open water for foraging. However, in the breeding season, terns (particularly little terns that may nest on beaches) are highly vulnerable to changing water levels, because their nests might be washed away. Ducks and waders require relatively shallow water levels to provide adequate feeding and roosting sites. Some ducks and larger waterfowl (e.g. Bewick swans) generally require considerably deeper water to provide suitable habitat.
- 15.4.55 There is one mechanism through which construction of the Proposed Development could negatively affect the hydrological regime in the Teesmouth and Cleveland Coast SPA / Ramsar, and especially the SPA / Ramsar that contains pools which are integral to the overwintering SPA / Ramsar waders and wildfowl:
 - Chapter 5: Construction Programme and Management (PEI Report, Volume I) outlines that the CO₂ transport corridor and the water discharge corridor will separately cross the Teesmouth and Cleveland Coast SPA / Ramsar, which would involve the installation of onshore pipelines. The excavations which may be required to embed the pipeline, have the potential to affect the hydraulic regime (mainly by altering the cone of depression) in the dune systems. This could reduce the level of water available to the SPA / Ramsar birds in the pools.
 - Impermeable surfaces within the Proposed Development (if representing a significant increase to the previous on-site development) are likely to increase the volume and speed of surface water runoff. Traditional drainage systems often cannot cope with the sheer volume of water, so sewer overflows are designed to discharge excess water directly into watercourses. Surface run-off has the potential to affect the water level in the SPA / Ramsar pools, as well as directly inundating nests of little terns.
- 15.4.56 A hydrological assessment of the construction of the CO₂ export and water discharge pipelines is planned with the results being presented within the ES which will accompany the DCO Application. This will include optimal pipeline routeing, with the intention of positioning the pipelines as far as possible from the major pools in the SPA / Ramsar. This will include an assessment of the hydrological connections of the pools to establish whether the pools are fed by groundwater or surface water, as this may have implications for the hydrological 'response' of the pools to the installation of the pipeline.





15.4.57 <u>However, until further evidence is available, it is uncertain whether the</u> <u>Proposed Development will result in changes to the hydrological regime in</u> <u>the pools of the Teesmouth and Cleveland Coast SPA / Ramsar.</u> If it occurred this could interfere with the supporting processes on which SPA habitats rely and therefore affect an SPA conservation objective. <u>Therefore, Likely</u> <u>Significant Effects cannot be excluded, and this impact pathway is screened</u> <u>in for Appropriate Assessment.</u>

15.4.58 In summary, the Proposed Development is screened in for Appropriate Assessment because

- Installation of the CO₂ transport / water discharge pipelines through the Teesmouth and Cleveland Coast SPA / Ramsar might change the hydrogeological regime of the site; this could result in the temporary and permanent impact on habitat. Therefore, it must be also noted that the effects of this impact pathway may extend into the operational phase of the Proposed Development (if pools were permanently lost); and
- An increase in the total area of impermeable urban surfaces close to the SPA / Ramsar pools could lead to higher runoff rates.

Disturbance in functionally linked habitat

- 15.4.59 Within the wider area of the Proposed Development there are four SACs designated for mobile species, including the Berwickshire and North Northumberland Coast SAC (approx. 87 km to the north; designated partly for grey seal), the Humber Estuary SAC (approx. 110 km to the south-east; designated partly for grey seal), The Wash and North Norfolk Coast SAC (approx. 174 km to the south-east; designated partly for harbour seal) and the Southern North Sea SAC (approx. 102 km to the east; designated partly for harbour porpoise). 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.
- 15.4.60 To support the DCO Application, OGCI has commissioned AECOM to undertake a marine mammal baseline characterisation study. The rationale behind this is to provide an evidence base establishing the importance (or otherwise) of the wider area around the Proposed Development for marine mammals that are qualifying species of the above-named SACs (please see Appendix 14C Marine Mammals of the PEI Report for the full baseline report).
- 15.4.61 Although the Zone of Influence (ZoI) of the Proposed Development is unlikely to extend beyond a few kilometres from the site boundary, the marine mammals found in the wider area are all wide-ranging transient species that form part of meta-populations. The highly transient nature of marine mammals must therefore be considered in more detail. The importance of the ZoI around the Proposed Development was assessed using a data set on Small Cetacean in European Atlantic waters and the North Seas (SCANS).







- 15.4.62 The North Sea grey seal colonies have increased rapidly up to 2016. Within the Northeast England Seal Management Unit, grey seal counts have also increased between 2008 and 2017. There are no reported breeding sites in the Teesmouth area, although the seals do use the wider marine area for foraging and use a haul-out site at Seal Sands. However, given the amount of habitat available for the wider North Sea populations, the area around the Proposed Development plays a very small part in the provision of overall habitat for this species. Furthermore, tagging and observational studies have shown little interaction and therefore movement between the different grev seal SAC populations. This makes it very unlikely that a significant number of individuals of the SAC populations are critically dependent on functionally linked habitat around the Proposed Development. Therefore, Likely Significant Effects on the grey seal populations of Berwickshire and North Northumberland Coast SAC and Humber Estuary SAC can be screened out from Appropriate Assessment as the conservation objectives of the sites would not be affected.
- 15.4.63 As highlighted in Appendix 14C of the PEI Report, the maximum number of harbour seal in the area around the Proposed Development has increased steadily since 2008. Seal Sands, opposite the Proposed Development on the western side of the River Tees, supports a breeding colony of harbour seal. Furthermore, the species is likely to use the wider marine area for foraging. However, given the amount of habitat available for the wider North Sea populations, the area around the Proposed Development plays a very small part in the provision of overall habitat for this species, makes it very unlikely that a significant number of individuals of the SAC populations is critically dependent on functionally linked habitat around the Proposed Development.
 <u>. Therefore, Likely Significant Effects on harbour seal population that breeds within The Wash & North Norfolk Coast SAC can be screened out from Appropriate Assessment as the conservation objectives of the site would not be affected.</u>
- 15.4.64 JNCC's Advice Note setting out the Management Units for cetaceans in UK waters, highlights that both the Southern North Sea SAC and the Proposed Development lie within the North Sea Management Unit for harbour porpoise (JNCC, 2015c). Harbour porpoise are present along the northeast coast of England all year and an assessment of the SCANS data highlights that the North Sea population has remained stable since the mid-1990's. Count block O of the SCANS data shows that the area around the Proposed Development has one of the highest densities of harbour porpoise (1.31 animals/km²) in the North Sea Management Unit. This species is considered to be threatened and declining in the Greater North Sea by the OSPAR commission, but in the UK is classified as having favourable conservation status by the JNCC. Overall, it is considered that the Proposed Development might affect the Southern North Sea SAC, depending on the number of harbour porpoise impacted and the extent to which they might be affected. Baseline information presented in the Marine Ecology chapter (Appendix 14C, PEI Report, Volume III) suggests that harbour porpoise can be expected to occur from time to time within the Tees Bay but are unlikely to venture into the estuary; this is discussed further within Appendix 14C: Marine Mammals (PEI Report, Volume III).



- 15.4.65 Anthropogenic noise (such as from impulsive construction works) can reduce the ability of marine mammals to echolocate and communicate, and it may also result in behavioural changes and physical injury. Marine mammal species are categorised into different hearing groups on the basis of their hearing sensitivities. Harbour porpoise, the only qualifying species identified above requiring further consideration, is a high-frequency cetacean⁸. Effects of anthropogenic noise may primarily manifest as impacts on hearing, such as permanent threshold shifts (PTS) and temporary threshold shifts (TTS).
- 15.4.66 Harbour porpoise are sensitive to noise disturbance arising from development construction, especially the high sound pressure levels generated by pile driving construction for offshore windfarms (Brandt, 2011). The construction of smaller coastal developments may also affect harbour porpoise but is less well explored. Notwithstanding, monitoring in Scotland has shown that such development may result in the local displacement of harbour porpoise. Scientific papers in the peer-reviewed literature have shown that acoustic disturbance resulting from development projects can result in the long-term impairment of the hearing system and local displacement of harbour porpoise (JNCC, 2015d).
- 15.4.67 Several construction activities associated with the Proposed Development will take place in the marine environment and have the potential to change the soundscape experienced by harbour porpoise, including geophysical survey, piling required for the cofferdam, dredging required at the abstraction and discharge points, trenching and any associated movements of marine vessels. To assess the potential effect of the most impactful element of the construction works to be undertaken in water, data for underwater sound modelling were compared to the sensitivity thresholds for harbour porpoise (for full details see Chapter 14: Marine Ecology and Nature Conservation (PEI Report, Volume I) The results of the simplified underwater sound modelling predicts relatively small impact distances of sonar sound sources related to construction, although for high frequency cetaceans such as harbour porpoise, the potential impact zone is estimated to extend up to 5.7 km from the sound source for TTS and 3 km for PTS. While behavioural thresholds for marine mammals are not well established, it is generally accepted that any noise impact with a transient effect on hearing (i.e. resulting in TTS) will have behavioural impacts⁹.
- 15.4.68 The Proposed Development might also involve other impulsive sound sources, such as a requirement for Unexploded Ordnance (UXO) detonations. At this preliminary stage, the presence of any magnetic anomalies indicating a potential UXO risk, exact locations and number of potential targets is unknown and will not be known prior to submission of the DCO Application. On this basis, a preliminary assessment is provided within Chapter 14: Marine Ecology and Nature Conservation (PEI Report, Volume I). Given that the area around the Proposed Development is considered



⁸ Southall B. L., Bowles A. E., Ellison W. T., Finneran J. J., Gentry R. J., Greene Jr C. R., Kastak D., Ketten D.R., Miller J.H., Nachtigall P.E., Richardson J.W., Thomas J.A, and Tyack P.L. 2007. Marine mammal noise exposure criteria: initial scientific recommendations. Aquatic Mammals. 33. 411 – 522.

⁹ Southall B. L., Bowles A. E., Ellison W. T., Finneran J. J., Gentry R. J., Greene Jr C. R., Kastak D., Ketten D.R., Miller J.H., Nachtigall P.E., Richardson J.W., Thomas J.A, and Tyack P.L. 2007. Marine mammal noise exposure criteria: initial scientific recommendations. Aquatic Mammals. 33. 411 – 522.



functionally linked to the Southern North Sea SAC and the relatively farreaching impact zones of UXO detonations (e.g. >10km for high frequency cetaceans), it is concluded that such detonations – without appropriate mitigation measures in place – might lead to TTS in cetaceans including harbour porpoise.

- 15.4.69 <u>Given the area's functional linkage with the Southern North Sea SAC and the</u> risk of unmitigated noise produced by marine construction works and UXO detonations, Likely Significant Effects cannot be excluded, and the marine construction works are screened in for Appropriate Assessment as it could affect the conservation objectives of the SAC by affecting population numbers. At that point the standard JNCC mitigation for piling and geophysical surveys will be taken into consideration.
- 15.4.70 The crossing of the gas connection under the River Tees will also involve working in water. This is anticipated to involve trenchless technologies, most likely horizontal directional drilling. These methods are far less noisy and impactful than the use of drive-piling and open-trench cutting, and therefore Likely Significant Effects of this element of the construction works is not considered to result in LSEs of harbour porpoise due to the general absence of underwater noise and is screened out from Appropriate Assessment as it will not affect the conservation objectives of Southern North Sea SAC.
- 15.4.71 Two sites to the north of the Proposed Development are designated for migratory fish; the River Tweed SAC (approx. 138 km to the north-west) and the Tweed Estuary SAC (approx. 137 km to the north-west). The River Tweed SAC is designated for Atlantic salmon and sea lamprey, while the Tweed Estuary SAC is designated for sea lamprey only. 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. However, given that development will be restricted to the intertidal zone, the dune system of the Teesmouth and Cleveland Coast SPA / Ramsar and a short section across the River Tees, it is concluded that there is no linking impact pathway to significantly interfere with the fish migration routes for these European sites. Therefore, the River Tweed SAC and the Tweed Estuary SAC are screened out from Appropriate Assessment as their conservation objectives will not be affected.
- 15.4.72 In summary, the Proposed Development is screened in for Appropriate Assessment with regard to potential for disturbance of harbour porpoise associated with the Southern North Sea SAC, pending further studies, as a result of construction of new parts of and amendments to the existing gas connection corridor that crosses the River Tees opposite Seal Sands.

Temporary effects on foraging resources of SPA / Ramsar birds

15.4.73 The Teesmouth and Cleveland Coast SPA / Ramsar is designated for breeding and overwintering birds that forage on invertebrates (the wading bird species) and small fish (the tern species). Some of the elements of the proposed works will temporarily alter the marine habitats in the area





surrounding the Proposed Development. This includes potential dredging (removal of sediment) around the water abstraction and discharge points, which lie in the River Tees and the Tees Bay respectively. Furthermore, the installation and operation of the temporary cofferdam will result in dewatering and a temporary impact on marine habitat. Therefore, both activities are likely to result in temporary changes to the abundance and spatial distribution of the foraging resources of the qualifying bird species.

- 15.4.74 Intertidal and subtidal habitats and their associated infaunal and epifaunal communities will be directly impacted as a result of dredging and cofferdam construction. However, soft sediments, which characterise much of the marine habitats around the Proposed Development, are highly resilient to direct physical disturbance arising from substrate loss. The spatial extent of the construction works in the marine environment would be comparatively small and it is expected that both habitats and their associated species would recover within 5 years. The temporary impact on intertidal and benthic habitat, while significant locally, would not be expected to be significant in the context of the wider availability of these habitats in the area. Chapter 14: Marine Ecology and Nature Conservation (PEI Report, Volume I) states that the footprint of the marine construction works on benthic and intertidal habitats and communities is predicted to be not significant.
- 15.4.75 Fish, the foraging resource for the terns, could also be affected by the temporary impact and physical disturbance in habitats affected by the marine construction works. While adult fish are able to move away from stressors and are considered less vulnerable to marine works, less mobile benthic life stages (e.g. eggs and larvae) are unable, or less able, to do so. However, the area affected by the marine construction works does not present habitat features that would render it a particular focal area for large fish congregations compared to the wider River Tees and coastal area, and is a geographically small part of the overall open water available for foraging by terns. Furthermore, recovery of fish species populations and linked habitats would also be expected on cessation of works.

15.4.76 <u>The temporary effects of marine construction on the foraging</u> resources of qualifying birds for the Teesmouth and Cleveland Coast SPA/Ramsar is therefore screened out from Appropriate Assessment as it would not affect the conservation objectives of the SPA.

Operational Period

Visual and noise disturbance

15.4.77 It has been confirmed that, 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 on the PCC Site, the component of the Proposed Development that is closest to the Teesmouth and Cleveland Coast SPA / Ramsar, would not result in visual disturbance of qualifying birds in this SPA / Ramsar because the pools in the dune systems are likely to be shielded from operational activities by the existing sea wall. Furthermore, the site of the Proposed Development has a long history of industrial use and it is therefore considered that the overwintering birds in this SPA / Ramsar will be





used to activity from site staff. <u>Overall, visual disturbance of Teesmouth and</u> <u>Cleveland Coast SPA/Ramsar during operation is screened out from</u> <u>Appropriate Assessment due to a combination of habituation and visual</u> <u>screening due to existing structures which will not interfere with the ability of</u> <u>the SPA to achieve its conservation objectives.</u>

- 15.4.78 An assessment of the potential for noise disturbance to qualifying bird species of the Teesmouth and Cleveland Coast SPA / Ramsar during the operational period was also undertaken, particularly because the PCC Site (containing the CCGT and CO₂ capture units) lies directly adjacent to the dune system of this SPA / Ramsar.
- 15.4.79 Noise modelling predicts that the operation of the Proposed Development will result in a maximum noise level of 50 dB *L*_{Aeq} in the dune system of the Teesmouth and Cleveland Coast SPA / Ramsar. This is below the existing daytime (56 dB *L*_{Aeq}) and in line with the night-time (47 dB *L*_{Aeq}) noise levels measured at location E1. Furthermore, it is considerably lower than the acceptable regular noise threshold of 70 dB (at receptor birds), which was identified in research undertaken for congregations of similar birds in the Humber Estuary¹⁰. Therefore, it is concluded that the operational phase of the Proposed Development would not result in Likely Significant Effects on the Teesmouth and Cleveland Coast SPA / Ramsar regarding operational noise disturbance due to the relatively low noise levels caused by the operational plant. This impact pathway is screened out from Appropriate Assessment as the ability of the SPA to achieve its conservation objectives will not be affected.
- 15.4.80 In summary, likely significant effects on Teesmouth and Cleveland Coast SPA/Ramsar due to operational disturbance are screened out due to a combination of visual screening by existing structures and the relatively low noise levels at the SPA/Ramsar caused by the operational plant.

Atmospheric pollution

- 15.4.81 The largest portion of atmospheric pollutants arising from the Proposed Development during the operational phase will derive from the operational Power and Capture plant. The CCGT units will generate electricity through the combustion of natural gas. The resulting combustion gases will contain NOx, which will be abated to some extent by the SCR abatement; however, this in itself will lead to an emission of ammonia.
- 15.4.82 An Atmospheric Impact Assessment (AIA) has been undertaken to determine the potential impact of the NOx and ammonia emission from the operational power station using detailed air dispersion modelling. The modelled predicted impacts have been used to produce isopleth plots (contours) to enable an assessment of the process contributions and the predicted environmental concentrations of NOx and NH₃ and the deposition of nitrogen and other atmospheric pollutants, at specific distances from the plant. No



¹⁰ Cutts, N., Phelps, A. and Burdon, D. 2009. Construction and waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Report to Humber INCA, Institute of Estuarine and Coastal Studies, University of Hull



sulphur dioxide will be emitted since the Proposed Development will be gasfired.

- 15.4.83 The Air Pollution Information System (APIS) forms the major source of information regarding the air pollution impact pathway. It specifies a critical NOx concentration (critical level) for the protection of vegetation of 30 μgm⁻³ and a critical level of 3 μgm⁻³ for ammonia. In addition, ecological studies have determined 'critical loads'¹¹ of atmospheric nitrogen deposition (that is, NOx combined with ammonia NH₃).
- 15.4.84 It has already been discussed in the Construction Period section of this HRA report that the terns of the Teesmouth & Cleveland Coast SPA/Ramsar are the only species which are sensitive to the broad impacts of NOx and nitrogen deposition and they do not nest in the closest part of the SPA/Ramsar to the operational facility (the area reported in Appendix 8B: Operations (PEI Report, Volume III)._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 that
 - 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.
- 15.4.85 The contribution of the Proposed Development to both NOx and ammonia (the Process Contribution or PC) will exceed 1% of the critical level at Teesmouth & Cleveland Coast SPA / Ramsar. However, at no point will total NOx or ammonia concentrations exceed the critical level at any of the four European sites covered by the AIA¹², even with the Proposed Development. The highest Predicted Environmental Concentration (i.e. the baseline, plus the Proposed Development and any other relevant projects expected over the same timetable) reported in Appendix 8B: Operations (PEI Report, Volume III) for NOx is equivalent to 70% of the critical level while that for ammonia is equivalent to 42% of the critical level. For NOx this occurs at Teesmouth & Cleveland Coast SPA and Ramsar site, while for ammonia it occurs at Durham Coast SAC. Since the critical levels will not be exceeded, the only effect that may arise is through direct effects of the pollutants in atmosphere.
- 15.4.86 Since the data reported in Appendix 8B: Operations (PEI Report, Volume III) are for a part of the SPA/Ramsar that does not support nesting terns (the only species vulnerable to the effects of nitrogen deposition on their habitats) this assessment instead examines the nitrogen dose expected at the closest current or historic tern nesting locations. The nitrogen deposition isopleths for the stack emissions from the Power and Capture plant show that there



¹¹ The critical load is the rate of deposition beyond which research indicates that adverse effects can reasonably be expected to occur

¹² Teesmouth & Cleveland Coast SPA/Ramsar site, North York Moors SAC/SPA, Northumbria Coast SPA/Ramsar and Durham Coast SAC



will be an additional nitrogen deposition (PC) of approx. 0.25 kg N/ha/yr at the historic tern nesting location (BC5) due to the Proposed Development alone. This would represent an additional deposition equivalent to 3% of the critical nitrogen load for the most sensitive habitat associated with the tern species (as identified on APIS - fixed dunes with a minimum critical load of 8 kgN/ha/yr). A 3% change in nitrogen deposition is a 'small' dose (typically defined as a dose of between 1% and 5% of the critical load) and this analysis is precautionary as it assumes that a) the minimum critical load for sand dunes is an appropriate proxy for the habitat at the tern nesting location BC5 and b) a direct effect on the habitat will translate into an indirect effect on suitability for nesting terns. Nonetheless, due to the forecast effect on BC5 and BC9, Likely Significant Effects of stack emissions from the operational Power and Capture plant on nesting terns cannot be excluded due to its potential effect on the structure and function of the habitats of the tern qualifying features of the Teesmouth & Cleveland Coast SPA, and thus on the site's conservation objectives. As a result, this impact pathway is screened in for Appropriate Assessment where the matter will be investigated further. It is to be noted that Location BC5 represents a small amount of suitable tern breeding habitat, but it has been determined that the location is likely to no longer be viable since it has not been used for breeding in recent years. Notwithstanding, as a precautionary measure, BC5 is considered in this assessment. Locations BC7 and BC8 are the current tern colonies, both of which will be subject to an insignificant nitrogen dose.

- 15.4.87 Also as stated in the previous chapter on the construction phase, the PCC Site lies directly adjacent to the sand dune systems in the Teesmouth and Cleveland Coast SPA / Ramsar. Deposition to these dunes from the PCC site would be 1 kg N/ha/yr to 1.85 kg N/ha/yr according to Appendix 8B. This is a large deposition, equivalent to between 13% and 23% of the critical load for the most sensitive type of dune system (fixed dunes, with a minimum critical load of 8 kgN/ha/yr). However, as noted in the construction section, the non-breeding birds that use these dunes and pools within the SPA / Ramsar are noted on APIS as not being sensitive to atmospheric nitrogen deposition on their habitat.
- 15.4.88 With regard to the North York Moors SAC (and the overlapping North York Moors SPA), neither acid deposition or nitrogen deposition due to the operational power and capture plant are forecast to exceed the 1% of the critical load criterion (rounded to the nearest whole percentage in line with IAQM guidance)¹³ for heathland and no other sources of atmospheric acid or nitrogen have been identified that would affect the same parts of the SAC/SPA 'in combination' with the Proposed Development. The habitat with the highest nitrogen sensitivity (blanket bog) is not appropriate to use in this assessment as it only occupies a small proportion of the SAC south of Kildale and lies beyond the distance for which the Proposed Development would result in any meaningful nitrogen deposition. As a result, Likely

¹³ Paragraph 5.5.2.6 of the Institute of Air Quality Management guidance regarding the assessment of air quality impacts on designated nature conservation sites clarifies that '*the 1% and 10% screening criteria should not be used rigidly and, not to a numerical precision greater than the expression of the criteria themselves*'. Source: <u>https://iaqm.co.uk/text/guidance/air-guality-impacts-on-nature-sites-2020.pdf</u>. In other words, the threshold is 1% rather than 1.0% and therefore a PC of 1.1% or 1.3% does not exceed the threshold in the opinion of IAQM.







Significant Effects of stack emissions from the Power and Capture plant on the North York Moors SAC (and overlapping SPA) can be excluded for North York Moors SAC/SPA.

- 15.4.89 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 for the international interest feature 'vegetated sea cliffs'; however, the nearest part of the SAC constitutes calcareous grassland and therefore the critical load for calcareous grassland (15 kgN/ha/yr) can be used as a proxy. Using that threshold nitrogen and acid deposition due to the operational plant is not forecast to exceed the 1% threshold and the critical load will not be breached for either pollutant. With regard to the Northumbria Coast SPA/Ramsar nitrogen deposition due to the Proposed development is not forecast to exceed 1% of the critical load at the closest part of the site (the international interest features of the site are not sensitive to acid deposition according to APIS). Moreover, 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, Likely Significant Effects on the Durham Coast SAC and the Northumbria Coast SPA / Ramsar from air pollution can be screened out.
- 15.4.90 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 16: Traffic & Transport (PEI Report, Volume I)identifies that the Proposed Development will have approx. 60 full-time staff working in three shifts and around 40 corporate staff working on site during normal working hours (09:00-17:00). Assuming a conservative car occupancy of 0.7 this equates to 70 cars driving to the Proposed Development per day and a total of 140 2-way vehicle movements. Furthermore, to deliver operational and maintenance plant, 4 Heavy Duty Vehicles (HDVs) will be on site per day. The traffic flow generated during the operational phase of the Proposed Development is well below the threshold for defining an 'Affected Road' in Highways England parlance¹⁴ and is therefore considered to have a negligible effect on air quality. Pollution from operational vehicle movements is therefore screened out from Appropriate Assessment.
- 15.4.91 In summary, the Proposed Development is screened in for Appropriate Assessment regarding operational atmospheric pollution due to the forecast nitrogen deposition on the nesting tern locations associated with the Teesmouth & Cleveland Coast SPA/Ramsar.

Water quality

15.4.92 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 phase. This includes potentially toxic surface run-off and leachate from machinery and plant involved in the day-to-day operation of



¹⁴ Defined as a change of 1,000 two-way AADT (Annual Average Daily Traffic)



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.

- 15.4.93 Regarding the issue of potentially toxic pollution during the operational phase, the same evidence base applies that was relevant in the construction period (see sections 15.4.35 15.4.42 above). Therefore, this impact pathway is not discussed further here.
- 15.4.94 In contrast to the construction phase, once operational the Proposed Development would provide staff with toilets that are connected to the mains. It is anticipated that wastewater will discharge into the local sewerage system, such as the Northumbrian Water Bran Sands Wastewater Treatment Works (WwTW). Therefore, the Proposed Development is likely to increase the volume of treated wastewater discharged into local waterbodies that are sensitive to changes in water quality. Typically, wastewater effluent is considered not to negatively impact European sites if it can be accommodated within the consented headroom of WwTWs, which is regulated by the Environment Agency's Review of Consents process. This is because the headroom is apportioned considering the qualifying features of the relevant European sites, ensuring that there are no adverse effects. <u>However, given that the WwTW infrastructure to be serving the Proposed</u> <u>Development has not yet been identified, this impact pathway is screened in</u> <u>for Appropriate Assessment as a precautionary measure.</u>
- 15.4.95 The CCGT units and its associated infrastructure, such as the CO₂ capture and processing equipment, will be cooled with water abstracted from the River Tees as a worst-case scenario. In the cooling process the water will warm up and will then be returned to the Tees Bay via a long outfall pipe. The discharge of heated cooling water and water used in the steam cycle also has potential impacts on water quality. The predominant source of chemical contaminants would be from the direct contact cooler blowdown. comprising water with elevated dissolved CO₂ and ammonia concentrations (also see Chapter 9: Surface Water, Flood Risk and Water Resources (PEI Report, Volume I)). Generally, the overall treated effluent rate is likely to be low and the coastline's open hydrodynamic conditions facilitate rapid dispersion. Mitigation approaches such as biological treatment, regular water quality monitoring and retention ponds, while identified, cannot be taken into account at the Likely Significant Effects stage. Therefore, as a precautionary measure, potential negative effects on water chemistry through discharged cooling water are screened in for Appropriate Assessment.
- 15.4.96, The discharge of cooling water is likely to also affect other abiotic parameters, such as water temperature and turbidity (the latter mediated through the erosion of sediment around the outfall pipe). However, this impact pathway will be assessed in the section on heated cooling water discharge below.
- 15.4.97 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;
- Water quality impacts as a result of discharged cooling water; and
- Wastewater effluent from domestic water usage within the site.

Discharge of heated cooling water

- 15.4.98 As highlighted above (see sections 15.4.92 15.4.97), most of the site's water requirement stems from the cooling duty for the CCGT units and its associated infrastructure. The worst-case scenario specifies that heated cooling water will be returned to the Tees Bay via existing hydrological outlets. One potential risk associated with the outflow of water into the Tees Bay, is potential wash-out and erosion of the intertidal mudflat habitats. This could lead to knock-on effects in the Teesmouth and Cleveland Coast SPA / Ramsar, such as accompanying increases in turbidity and water temperature. However, assessments for the PEI Report indicate that the volume of cooling water to be used in the Proposed Development will be relatively low and the volume and velocity of water returned to the marine environment will also be low such that erosion will not arise. Moreover, nearfield thermal plume modelling has been undertaken for the PEI Report to trace the likely extent of thermal discharge at the proposed outfall location. This confirms that the likely extent of a thermal plume (of the properties modelled) would be localised and would thus be very unlikely to influence fish and invertebrate prey numbers relating to the Teesmouth & Cleveland Coast SPA/Ramsar.
- 15.4.99 Chapter 14: Marine Ecology and Nature Conservation (PEI Report, Volume I discusses that the intertidal habitats and communities (that the qualifying species of the SPA / Ramsar depend on) around the outfall of the Cooling Water System (CWS) are already subject to higher temperature variability (10 degrees measured in 1966) than that likely to be caused by the thermal plume (a maximum of 5degrees increase up to a distance of 61.3m during peak ebb tide. The subtidal habitats and communities in the area have a low sensitivity to temperature changes and any effects on community composition are expected to be highly localised, being restricted on the immediate vicinity of the outfall head.
- 15.4.100 <u>It is therefore concluded that impacts on European sites due to the</u> return of cooling water at the outfall location will not result in Likely Significant Effects and can be screened out of Appropriate Assessment.
- 15.4.101 In summary, the Proposed Development is screened out of Appropriate Assessment regarding the Teesmouth and Cleveland Coast SPA/Ramsar because the volume of cooling water to be used in the Proposed Development will be low, the volume and velocity of water returned to the marine environment will also be low and the thermal plume associated with release of water will be very localised.





Entrapment of food resources

- 15.4.102 One of the primary concerns associated with the operation of directcooled thermal power stations is the potential for entrapment of marine organisms, including fish (at all life stages, but particularly in early life stages) in plant cooling systems. Ichthyoplankton (fish eggs and larvae) that are small enough to pass through the intake screens and unable to swim against the water current may be entrained and passed through the cooling water system. In the system organisms are subject to a range of stressors, including pressure changes, mechanical abrasion and biocide toxicity. At the outfall location, entrained animals are at increased risk of predation (see Chapter 14: Marine Ecology and Nature Conservation (PEI Report, Volume I). Other organisms might become impinged on the intake screens, resulting in physical injury, abrasion and increased predation.
- 15.4.103 Overall, entrapment (this encompasses both entrainment and impingement) is likely to lead to increased mortality, ultimately leading to declines in the abundance and biomass of fish. Entrapment may have indirect effects on qualifying SPA / Ramsar species, particularly seabirds, if the affected organisms are significant components of the seabirds' foraging resources.
- 15.4.104 The Teesmouth and Cleveland Coast SPA / Ramsar is designated for several seabird species, including little tern and common tern. Terns are specialists that forage on several species of small fish (e.g. sand eels, clupeids and gadoids), all of which are known to be vulnerable to entrainment in cooling water systems. Due to their selective foraging strategy, terns are particularly vulnerable to fluctuations in prey abundance and shifts in the community composition of prey. The qualifying wading bird species of the Teesmouth and Cleveland Coast SPA / Ramsar do not depend on a narrow range of fish species that may be entrapped. They are not considered to be vulnerable to entrapment.
- 15.4.105 Dietary Equivalence Analysis (DEA) has been recently proposed as a method to measure the indirect effects of entrainment on marine predators by estimating the proportion of the total prey that is impinged in cooling water systems (Young & Charalampopoulou, 2019). In a worked example the paper predicted that prey for approx. 124 Arctic tern adults or 269 chicks would be impinged during one breeding season in the modelled direct-cooled thermal power station. Given that a large portion of the water requirement for cooling duties within the Proposed Development will be abstracted from the River Tees, the potential for entrainment of the terns' food resources requires further attention.
- 15.4.106 It is to be noted that both Chapter 4: Proposed Development and Chapter 5: Construction Programme and Management (PEI Report, Volume I) highlight that, depending on the available capacity, the preferred source of water for the cooling duty in the Proposed Development is from the existing Northumbrian Water Ltd. mains feed to the former Redcar Steelworks. However, if this is not available, the existing former steelworks abstraction (located in the River Tees) and discharge (located in the Tees Bay) points will be used. Until the use of the Northumbrian Water Ltd. connection is





confirmed, this HRA assesses the worst-case (i.e. abstraction from the River Tees), in line with the Rochdale Envelope.

- 15.4.107 The Proposed Development will use a hybrid cooling technology (wet / dry cooling), which reduces the demand for cooling water. The worst-case abstraction rate for each CCGT unit will be 0.61 m³/s, resulting in an overall abstraction rate for the three CCGT units of 1.83 m³/s. This is significantly lower than the licensed abstraction of the former Redcar Power Station (8.3 m³/s). The anticipated abstraction velocities are low and likely mean that the impacts of entrapment of the Proposed Development are likely to be non-significant (see Chapter 14: Marine Ecology and Nature Conservation (PEI Report, Volume I).
- 15.4.108 However, the magnitude of entrainment will also depend on several other parameters associated with a development, including approach velocity, water temperature and mesh size of potential protective screens. However, these parameters are currently not available for the Proposed Development. It is understood that a screening for the Best Available Technique (BAT) is currently being advised to evaluate the optimum mesh size for minimising entrainment while ensuring the smooth operation of the Proposed Development. The BAT screening will be carried out in consultation with relevant stakeholders and consider best practice guidance for eel screening (which will also benefit other species). If a particular BAT screening technology were to be used to mitigate indirect effects on qualifying seabirds, this would have to be assessed in the Appropriate Assessment document for the DCO Application.
- 15.4.109 Overall, given the current evidence, it is likely that the overall abstraction volume and approach velocity will be low enabling most organisms to avoid entrainment or impingement. Therefore, it is considered unlikely that the Proposed Development would significantly deplete the foraging stock of sandeels, clupeids and gadoids for the qualifying terns. As a result, Likely Significant Effects on the Teesmouth & Cleveland Coast SPA/Ramsar due to fish entrainment are screened out from Appropriate Assessment since the conservation objectives of the SPA will not be affected.

15.4.110 In summary, entrapment of prey leading to depletion of tern foraging resources is screened out of Appropriate Assessment as it is not expected to occur to a significant extent.

Coastal squeeze

15.4.111 Coastal squeeze is a term that originates from coastal management, whereby intertidal habitats used by 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.





15.4.112 While the project proposes the construction of several CCGT units and its infrastructure, thereby undoubtedly contributing brownfield development in a coastal landscape, the PCC (which will be the main above-ground development) will be constructed on an existing brownfield site, the former Sahaviriya Steel Industries UK Limited steel works. As such, the project will not result in any loss of greenfield land adjacent to the coast. <u>Overall, it is considered that Likely Significant Effects can be excluded, and coastal squeeze as a result of the Proposed Development is screened out from Appropriate Assessment as it will not arise.</u>

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

Plans / Projects to be considered In-Combination

- 15.4.114 It is a requirement of Regulation 63(a) of the Conservation of Habitats and Species Regulations 2017 (as amended) 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.
- 15.4.115 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.
- 15.4.116 For the purposes of this HRA, we have identified several plans, projects and strategies proposing / aiming for development, which may act in-combination with the Proposed Development. The following projects / plans require consideration:
 - The offshore geological storage of carbon that will form a separate element of this wider project, consisting of:
 - installation of the continuation of the CO₂ export pipeline from below MHWS to the geological storage facility, located approximately 150 km to the ESE of Teesside; and
 - the geological storage facility itself, which will require the construction of either a sub-sea injection system or an un-manned platform for the injection of exported CO₂ using a well or wells bored into the underground storage reservoir over 1,000 m below





sea level. The injection wells will be drilled and completed using a jack-up drilling rig;

- 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 24 (Cumulative and Combined Effects) of the PEI Report, such as ICL tees dock, refurbishment of redundant 'coal rail pit' for handling polysulphate products, potash conveyor, Tees Dock Terminal, Teesport.
- 15.4.117 These will be analysed for the DCO Application HRA, particularly with regard to 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.

- 15.4.118 The following impacts have been screened out with regard to the Proposed Development:
 - Construction period air quality no pathway since no European sites lie within the influence zone of the Proposed Development;
 - Construction period treated wastewater no pathway since such wastewater will be taken off-site;
 - Habitat loss from construction in the River Tees no pathway since pipeline construction across the river will be via trenchless technologies;
 - Construction disturbance on more distant European sites due to impacts on grey seal and harbour seal and disruption of fish migration – no impact as the affected area does not constitute important functionally-linked habitat for the SACs in question;
 - Visual disturbance of SPA/Ramsar birds using Coatham Sands/Dunes during operation of the Proposed Development – no impact pathway due to the intervening presence of the sea wall;
 - Disturbance due to operational noise no impact pathway as operational noise levels will fall below the disturbance threshold;
 - Discharge of cooling water no impact pathway as volumes and velocities of cooling water returned to the sea will be low and the thermal effect very localised;
 - Operational fish entrainment no meaningful entrainment is expected to occur; and
 - Coastal squeeze no impact pathway as the footprint of the Proposed Development is already defended by the sea wall and the seaward sand dunes.
- 15.4.119 In all instances, this was due to the absence of a meaningful pathway of impact.

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Annex A Relevant Impact Pathways

The European sites included within this screening assessment are:

- Teesmouth and Cleveland Coast SPA / Ramsar (including extension);
- North York Moors SAC;
- North York Moors SPA;
- Durham Coast SAC;
- Northumbria Coast SPA / Ramsar
- Berwickshire and North Northumberland Coast SAC;
- Humber Estuary SAC;
- Southern North Sea SAC;
- The Wash and North Norfolk Coast SAC;
- River Tweed SAC; and
- Tweed Estuary SAC.





Appendix 15C-1: The impact pathways considered in this No Likely Significant Effects Report, which are referred to in the detailed screening matrices below.

Designation	Impact Pathways identified on the current evidence base	Presented in Screening Matrices as
Teesmouth and Cleveland Coast SPA / Ramsar	Visual and noise disturbance during construction and operation Atmospheric pollution during construction and operation Deterioration in water quality during construction and operation from a variety of sources, such as oil and chemical spills and treated wastewater effluent Direct temporary habitat impact Changes to the hydrological conditions in the pools of the SPA / Ramsar during construction (potentially affecting the pools through to the operational phase) Coastal squeeze upon completion of the project Discharge of heated cooling water during operation Temporary effects on foraging resources during construction	Visual and noise disturbance Atmospheric pollution Water quality Discharge of heated cooling water Direct temporary habitat loss Hydrological impacts Entrapment Coastal squeeze Temporary effects on foraging resources
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
Northumberland Coast SPA / Ramsar	Atmospheric pollution during operation	Atmospheric pollution





Designation	Impact Pathways identified on the current evidence base	Presented in Screening Matrices as
Berwickshire and North Northumberland Coast SAC	Disturbance of functionally linked habitat during construction	Disturbance of functionally linked habitat
Humber Estuary SAC	Disturbance of functionally linked habitat during construction	Disturbance of functionally linked habitat
Southern North Sea SAC	Disturbance of functionally linked habitat during construction	Disturbance of functionally linked habitat
The Wash and North Norfolk Coast SAC	Disturbance of functionally linked habitat during construction	Disturbance of functionally linked habitat
River Tweed SAC	Disturbance of functionally linked habitat during construction	Disturbance of functionally linked habitat
Tweed Estuary SAC	Disturbance of functionally linked habitat during construction	Disturbance of functionally linked habitat



Annex B Screening Matrices

Appendix 15C-2: Detailed screening matrix assessing the qualifying features of the Teesmouth and Cleveland Coast SPA / Ramsar against the identified impact pathways during construction (C columns) and operation (O columns). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site Qualifying

features

	Effect		Visua noise distur	l and bance	Atmospheri c pollution ¹⁵		Water Quality		Hydrologica I Impacts		Direct temporar y habitat impact	Temporary effects on foraging resources	Entrapmen t	Discharg e of heated cooling water	Coastal squeeze
	Stage Propose Develop	of ed ment	С	0	С	0	С	0	С	0	С	С	0	0	0
Teesmouth and Cleveland Coast SPA / Ramsar	Little terr albifrons	n Sterna	×a	×c	×d	√f	√g	√g	√h	√h	×i	×k	×I	×n	x 0
	Commor Sterna h	n tern <i>irundo</i>	√b	×c	×d	√f	√g	√g	√h	√h	×i	×k	×I	×n	×o
	Sandwic Sterna sandvice	h tern ensis	√b	×c	×d	×f	√g	√g	√h	√h	×i	×k	×I	×n	x 0
	Pied Recurvir avosetta	avocet ostra	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	x 0
	Knot <i>canutus</i>	Calidris	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	x 0
	Ruff <i>pugnax</i>	Calidris	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	x 0

¹⁵ These reflect temporary screening decisions. For example, atmospheric pollution is currently screened in for the operational phase, because the air dispersion modelling is subject to revision.



European site Qualifying

features

Effect	Visual and noise disturbance		Atmo c pol	tmospheri pollution ¹⁵	Water Quality		Hydrologica I Impacts		Direct temporar y habitat impact	Temporary effects on foraging resources	Entrapmen t	Discharg e of heated cooling water	Coastal squeeze
Stage of Proposed Development	С	0	С	0	С	0	С	0	С	С	0	0	0
Redshank <i>Tringa totanu</i> s	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	x 0
Ringed plover Charadrius hiaticula	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	×o
Sanderling Calidris alba	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	x 0
Lapwing Vanellus vanellus	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	×o
Shelduck Tadorna tadorna	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	×o
Cormorant Phalacrocorax carbo	√b	×c	×e	×e	√g	√g	√h	√h	√j	×k	×m	×n	×o

- a. The assessment in paragraph 15.4.9 highlights that Likely Significant Effects of visual and noise disturbance on nesting little and common terns during the construction period can be excluded. This is because the closest known nesting location (Coatham) lies over 2km from the PCC site.
- b. Paragraph 15.4.13 highlights that Likely Significant Effects of noise disturbance on the pools of the SPA / Ramsar arising from sheet piling in the PCC site cannot be excluded, as piling will result in an increase of 10 dB(A) LAeq in the pools of the SPA / Ramsar. Therefore, it is considered that mitigation measures will be required to avoid adverse effects on site integrity.




- c. The screening in paragraph 15.4.79 highlights that the operational phase of the Proposed Development will not result in Likely Significant Effects on the Teesmouth and Cleveland Coast SPA / Ramsar. This is because the operation of the PCC site will not result in material changes to the LAmax and LAeq experienced by qualifying birds.
- d. Little tern, common tern and sandwich tern are the only qualifying species that APIS identifies as sensitive to atmospheric pollution. However, paragraph 15.4.32 shows that there are no tern nests within 200 m of the identified Affected Road Network of the Proposed Development. Likely Significant Effects of atmospheric pollution on the terns can therefore be excluded. While breeding sandwich terns are sensitive to atmospheric pollution in principle, this is not designated as a breeding species for the SPA / Ramsar and therefore not sensitive to nitrogen deposition from the Proposed Development.
- e. The qualifying species marked e are not sensitive to atmospheric nitrogen deposition according to APIS (Paragraph 15.4.28).
- f. Operational site traffic has been screened out from the assessment, because the Proposed Development will only involve 140 2-way daily traffic movements. However, paragraph 15.4.82 shows that the Proposed Development will contribute approx. 3% of the critical nitrogen load at two historic tern nesting sites. Therefore, Likely Significant Effects from atmospheric nitrogen deposition of the operational stacks cannot be excluded and this impact pathway is screened in for Appropriate Assessment. While breeding sandwich terns are sensitive to atmospheric pollution in principle, this is not designated as a breeding species for the SPA / Ramsar and therefore not sensitive to nitrogen deposition from the Proposed Development.
- g. The Teesmouth and Cleveland Coast SPA / Ramsar (and SPA / Ramsar) is sensitive to negative changes in the water quality during the construction period. Paragraph 15.4.41 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. Until further evidence is available, this impact pathway is screened in for Appropriate Assessment. Equally, Likely Significant Effects during the operational period cannot be excluded. Until further information on the WwTW infrastructure serving the Proposed Development is available, water quality in the operational period is screened in for Appropriate Assessment.
- h. The CO₂ transport pipeline will traverse the dune system and the pools of the SPA / Ramsar, which is an integral supporting loafing and foraging habitat for the overwintering birds. Paragraph 15.4.55 highlights that the construction of the pipeline may lead to hydrological changes in the pools of the SPA / Ramsar and Likely Significant Effects on the qualifying birds therefore cannot be excluded. An investigation into the best routing and hydrological impacts of the pipeline is ongoing. Until further evidence is available, this impact pathway is screened in for Appropriate Assessment.
- i. Paragraph 15.4.49 discusses the construction of the gas pipeline below the River Tees in relation to the foraging terns. However, the pipeline will be directdrilled below the river bed and will therefore not result in the loss of tern foraging habitat.
- j. Construction of the CO₂ pipeline through the dune system of the SPA / Ramsar is likely to result in the direct temporary impact on habitat (until such habitat is restored). This is because the construction process will involve the presence of staff within or adjacent to the SPA / Ramsar and, potentially, excavation of a trench through the dune system. Until further details on the construction and habitat restoration process are available, this impact pathway is screened in for Appropriate Assessment.
- k. Paragraphs 15.4.74 and 15.4.75 discuss that the construction activities might lead to temporary effects on the foraging resources of the wading birds and tern species. However, any effects of such activities is concluded to be very localised and is therefore excluded from Appropriate Assessment.





- . The abstraction of cooling water from the River Tees might result in the entrapment of foraging resources for the SPA's / Ramsar's qualifying terns. As paragraphs 15.4.106 and 15.4.108 identify, the potential for entrapment depends on several parameters, such as abstraction volume, velocity and the mesh size of protective screens. While BAT screening for the optimum mesh size is ongoing, given the relatively low volume of cooling water required, paragraph 15.4.109 concludes that a significant depletion of tern prey resources is unlikely and this impact pathway is screened out from Appropriate Assessment.
- m. These species are not considered to be sensitive to the indirect effects of entrapment (Paragraph 15.4.104). Therefore, they are screened out from Appropriate Assessment.
- n. The qualifying species of the SPA / Ramsar are potentially sensitive to the indirect effects of erosion and wash-out as a result of the discharge of heated cooling water, which may lead to an increase in the turbidity and water temperature near the discharge point. However, modelling of the thermal plume resulting from discharge of heated cooling water has demonstrated that the plume is likely to be very localised (see paragraph 15.4.101). Therefore, Likely Significant Effects can be excluded, and this impact pathway is screened out from Appropriate Assessment.
- o. Paragraph 15.4.112 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.





Appendix 15C-3: Detailed screening matrix assessing the qualifying features of the North York Moors SAC against the identified impact pathway during operation (O column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site	Qualifying features	Impact pathways identified relevant to the Proposed Development
	Effect	Atmospheric pollution
	Stage of Proposed Development	0
North York Moors SAC	Northern Atlantic wet heaths with <i>Erica tetralix</i>	×a
	European dry heaths	×a
	Blanket bogs	×b

- a. Paragraph 15.4.88 indicates that the operation of the PCC site would not result in a nitrogen or acid dose exceeding 1% of the critical load for the wet heaths or dry heaths habitat components in the North York Moors SAC. Therefore, this impact pathway is screened out from Appropriate Assessment.
- b. Paragraph 15.4.88 also highlights that the operational nitrogen deposition from the PCC 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.





Appendix 15C-4: Detailed screening matrix assessing the qualifying features of the North York Moors SPA against the identified impact pathway during operation (O column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO application. The matrix key is provided below Appendix 15C-12.

European site	Qualifying features	Impact pathways identified relevant to the Proposed Development
	Effect	Atmospheric pollution
	Stage of Proposed Development	0
North York Moors SPA	Merlin Falco columbianus	√a
	Golden plover Pluvialis apricaria	×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). Based on the air dispersion modelling (paragraph 15.4.88), the Proposed Development would not result in nitrogen or acid doses exceeding the 1% of the critical load criterion on the merlin's supporting habitat. Therefore, this impact pathway is screened out from Appropriate Assessment.
- b. Golden plovers depend on moss and lichen dominated mountain summits as well as raised and blanket bogs (both have a critical nitrogen load of 5-10 kg N/ha/yr). The air dispersion modelling (paragraph 15.4.88) shows that the Proposed Development would not result in a material increase in nitrogen deposition on the blanket bogs of the SPA. Therefore, this impact pathway is screened out from Appropriate Assessment





Appendix 15C-5: Detailed screening matrix assessing the qualifying features of the Durham Coast SAC against the identified impact pathways during operation (O column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site	Qualifying features	Impact pathways identified relevant to the Proposed Development
	Effect	Atmospheric pollution
	Stage of Proposed Development	10
Durham Coast SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts	xa

a. Paragraph 15.4.89 highlights that 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.





Appendix 15C-6: Detailed screening matrix assessing the qualifying features of the Northumberland Coast SPA / Ramsar against the identified impact pathways during operation (O). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site		Qualifying features	Impact pathways identified relevant to the Proposed Development
		Effect	Atmospheric pollution
	Stage of Proposed Development	C	
Northumberland Coast SPA / Ramsar	Coast	Purple sandpiper Calidris maritima	×a
		Ruddy turnstone Arenaria interpres	×a
		Little tern Sterna albifrons	×a

a. Paragraph 15.4.89 details that the nesting little tern are the only qualifying feature of the Northumberland 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.



Appendix 15C-7: Detailed screening matrix assessing the qualifying features of the Berwickshire and North Northumberland Coast SAC against the identified impact pathways during construction (C column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site		Qualifying features	Impact pathways identified relevant to the Proposed Development
		Effect	Disturbance in functionally linked habitat
		Stage of Proposed Development	С
Berwickshire and North Northumberland Coas SAC	North Coast	Mudflats and sandflats not covered by seawater at low tide	
		Large shallow inlets and bays	
		Reefs	
		Submerged or partially submerged sea caves	
		Grey seal Halichoerus grypus	×a

a. Paragraph 15.4.62 discusses that grey seal use functionally linked habitat beyond designated site boundaries. However, tagging studies have shown no significant migration between the four estuarine / marine SACs identified as potentially relevant to the Proposed Development. Therefore, this species is screened out from Appropriate Assessment.





Appendix 15C-8: Detailed screening matrix assessing the qualifying features of the Humber Estuary SAC against the identified impact pathway during construction (C column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site	Qualifying features	Impact pathways identified relevant to the Proposed Development
	Effect	Disturbance of functionally linked habitat
	Stage of Proposed Development	C
Humber Estuary SAC	Estuaries	
	Mudflats and sandflats not covered by seawater at low tide	
	Sandbanks which are slightly covered by sea water all the time	
	Coastal lagoons	
	Salicornia and other annuals colonizing mud and sand	
	Atlantic salt meadows (<i>Glauco-Puccinellietalia</i> <i>maritimae</i>)	
	Embryonic shifting dunes	
	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")	
	Fixed coastal dunes with herbaceous vegetation ("grey dune")	
	Dunes with <i>Hippopha</i> <i>rhamnoid</i> es	
	Sea lamprey Petromyzon marinus	×a
	River lamprey Lampetra fluviatilis	×b
	Grey seal Halichoerus grypus	×c

- a. Paragraph 15.4.71 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, there will not be Likely Significant Effects of the Proposed Development due to its long distance to the Humber Estuary SAC.





c. Paragraph 15.4.62 discusses that grey seal use functionally linked habitat beyond designated site boundaries. However, tagging studies have shown no significant grey seal migration between the four estuarine / marine SACs identified as potentially relevant to the Proposed Development. Therefore, this species is screened out from Appropriate Assessment.





Appendix 15C-9: Detailed screening matrix assessing the qualifying features of the Southern North Sea SAC against the identified impact pathway during construction (C column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site	Qualifying features Effect		Impact pathways identified relevant to the Proposed Development Disturbance in functionally linked habitat
	Southern North Sea SAC	Harbour Phocoena pho	porpoise coena

a. Paragraphs 15.4.64 and 15.4.66 discuss that harbour porpoise use habitat surrounding the Proposed Development and that they are sensitive to underwater noise disturbance. Given that harbour porpoise use habitat around the Proposed Development and the functional linkage to the Southern North Sea SAC, this impact pathway is screened in for Appropriate Assessment.





Appendix 15C-10: Detailed screening matrix assessing the qualifying features of the Wash and North Norfolk Coast SAC against the identified impact pathway during construction (C column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO application. The matrix key is provided below Appendix 15C-12.

European site		Qualifying features	Impact pathways identified relevant to the Proposed Development
		Effect	Disturbance in functionally linked habitat
		Stage of Propose Development	d C
The Wash and North Norfolk Coast SAC	North	Sandbanks which ar slightly covered by se water all the time	e a
		Mudflats and sandflats no covered by seawater a low tide	ot It
		Large shallow inlets an bays	d
		Reefs	
		Salicornia and othe annuals colonizing mu and sand	r d
		Atlantic salt meadow (Glauco-Puccinellietalia maritimae)	S
		Mediterranean an thermo-Atlantic halophilous scrub (Sarcocornetea fruticose)	d s
		Coastal lagoons	
		Harbour seal Phoc vitulina	a ×a
		Otter Lutra lutra	×b

- a. Paragraph 15.4.63 discusses that harbour seal use functionally linked habitat beyond designated site boundaries. However, the area surrounding the Proposed Development is not considered to be heavily used in the context of the wider North Sea harbour seal population. Therefore, this species is screened out from 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.





Appendix 15C-11: Detailed screening matrix assessing the qualifying features of the River Tweed SAC against the identified impact pathway during construction (C column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO Application. The matrix key is provided below Appendix 15C-12.

European site	Qualifying features	Impact pathways identified relevant to the Proposed Development	
	Effect	Disturbance in functionally linked habitat	
	Stage of Proposed Development	С	
River Tweed SAC	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation		
	Atlantic salmon <i>Salmo</i> salar	×a	
	Otter Lutra lutra	×b	
	Sea lamprey Petromyzon marinus	×a	
	Brook lamprey <i>Lampetra</i> planeri	×b	
	River lamprey Lampetra fluviatilis	×b	

- a. Paragraph 15.4.71 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, these species are screened out from Appropriate Assessment.
- b. While otter, brook lamprey and river lamprey 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 River Tweed SAC.



Appendix 15C-12: Detailed screening matrix assessing the qualifying features of the Tweed Estuary SAC against the identified impact pathways during construction (C column). It is to be noted that the screening decisions reflect the currently available evidence base and may be revised for the DCO application. The matrix key is provided below the table.

European site	Qualifying features	Impact pathways identified relevant to the Proposed Development
	Effect	Disturbance of functionally linked habitat
	Stage of Proposed Development	C
Tweed Estuary SAC	Estuaries	
	Mudflats and sandflats not covered by seawater at low tide	
	Sea lamprey Petromyzon marinus	×a
	River lamprey <i>Lampetra</i> fluviatilis	×b

- a. Paragraph 15.4.71 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, there will not be Likely Significant Effects of the Proposed Development due to its long distance to the Tweed Estuary SAC.

General matrix key:

- Likely significant effect cannot be excluded
- \mathbf{X} = Likely significant effect **can** be excluded
- C = Construction
- O = Operation

