



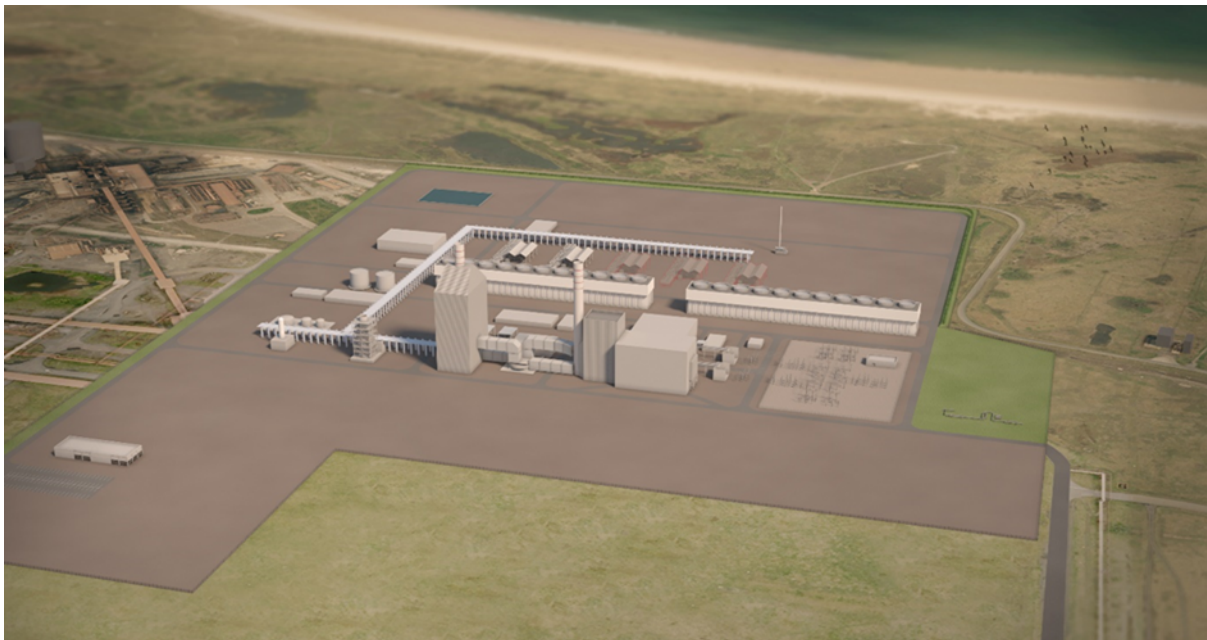
# Net Zero Teesside – Environmental Statement

Planning Inspectorate Reference: EN010103

Volume III – Appendices

Appendix 24C: Statement of Combined Effects

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



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## Table of Contents

<b>24C. Statement of Combined Effects .....</b>	<b>24-1</b>
24.1 Executive Summary.....	24-1
24.2 Introduction.....	24-2
24.3 Overview.....	24-6
24.4 Environmental Baseline (onshore and offshore).....	24-7
24.5 Effects and Mitigation Review.....	24-14
24.6 Identification and Assessment of Combined Effects .....	24-29
24.7 Consideration of Onshore and Offshore Effects .....	24-38
24.8 Summary and Conclusions.....	24-62
References.....	24-64

## Figures

Figure 24C-1: Strategic Environmental Constraints .....	24-66
Figure 24C-2: Key Marine Constraints (Tees Bay) .....	24-67

## Diagrams

Diagram 24C- 1: Overview of NEP Proposals .....	24-7
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## Tables

Table 24C- 1: Onshore Scheme - Consultation Summary.....	24-3
Table 24C- 2: Summary of Environmental Constraints (Onshore Scheme).....	24-8
Table 24C- 3: Summary of Environmental Constraints (Offshore Scheme).....	24-10
Table 24C- 4: Effects and Mitigation Review (Onshore Scheme).....	24-15
Table 24C- 5: Impacts and Mitigation Review (Offshore Scheme) .....	24-22
Table 24C- 6: Summary of Potential Impacts .....	24-29
Table 24C- 7: Basis of Combined Effects Assessment.....	24-31
Table 24C- 8: Summary of Effects (Onshore Scheme).....	24-40
Table 24C- 9: Summary of Effects (Offshore Scheme).....	24-51

# 24C. Statement of Combined Effects

## 24.1 Executive Summary

- 24.1.1 Net Zero Teesside Power and Net Zero North Sea Storage are seeking Development Consent for the construction, operation, maintenance and eventual decommissioning of the Net Zero Teesside (NZN) Carbon Capture, Usage and Storage (CCUS) Project (the Proposed Development) on land at Redcar and Stockton-on-Tees on Teesside. Alongside this, separate consent will be required for the offshore transport and storage infrastructure for captured CO<sub>2</sub> to be directed and injected into the Endurance Store beneath the North Sea.
- 24.1.2 The Proposed Development (onshore works) and associated offshore works are being progressed by separate – albeit related – Applicants and will be consented under separate regimes (see Chapter 4: The Proposed Development, Section 4.8, ES Volume I, Document Ref. 6.4 and Other Consents and Licences, Document Ref. 5.10). Both consents will be supported by Environmental Impact Assessment (EIA).
- 24.1.3 In order to aid the Examining Authority and Secretary of State in their consideration of the complete effects arising from both the onshore and offshore works, this report provides a summary of potential effects from both schemes. The information available surrounding the offshore works is at a less advanced stage than the on-shore works; however, recognising the high-level principles of the EIA process, and the need to consider the ‘project as a whole’, this approach presents the information required to consider the potential environmental effects associated with the offshore works. Consideration has therefore been given to the potential for shared receptors to be affected by both the onshore and offshore works.
- 24.1.4 Based on the screening completed, a small number of potential combined effects have been identified which wholly relate to the geographical area of overlap between the separate consents, principally in the Tees Bay. The potential combined effects arising from the onshore and offshore works are related to marine ecology, ornithology, fisheries and socioeconomics / effects on other users of the sea.
- 24.1.5 Having completed an appraisal of the combined effects arising from the onshore and offshore activities, no additional significant effects have been identified.

## 24.2 Introduction

### The Applicants

- 24.2.1 Net Zero Teesside (NZT) Power and Net Zero North Sea (NZNS) Storage are seeking Development Consent for the construction, operation, maintenance and eventual decommissioning of the NZT CCUS Project (the Proposed Development) on land at Redcar and Stockton-on-Tees on Teesside. Alongside this, separate consent will be required for offshore transport and storage infrastructure for captured CO<sub>2</sub> to be directed and injected into the Endurance Store beneath the North Sea.
- 24.2.2 For the Proposed Development, NZT Power will be responsible for NZT in so far as it relates to the construction, operation and eventual decommissioning of the electricity generating station together with its carbon capture plant. NZNS Storage will be responsible for the construction, operation and decommissioning of the equipment required for the high-pressure compression of CO<sub>2</sub> from the electricity generating station and local businesses/industries, as well as the CO<sub>2</sub> gathering network and the onshore section of the CO<sub>2</sub> transport/export pipeline – these are all within the scope of the Application for the Proposed Development.
- 24.2.3 NZNS Storage will also be responsible for the offshore elements of NZT, comprising the offshore section of the CO<sub>2</sub> Export Pipeline to the offshore geological CO<sub>2</sub> storage site under the North Sea, CO<sub>2</sub> injection wells and associated infrastructure.

### Objectives

- 24.2.4 Whilst the onshore and offshore elements of the project form a single initiative, they are consented under separate regimes:
- a Development Consent Order (DCO) for the onshore elements (i.e. mainly above Mean Low Water Springs (MLWS)); and
  - an Oil and Gas Authority (OGA) Carbon Dioxide Appraisal and Storage Licence and Permit, as required, for the offshore storage element (i.e. below Mean High Water Springs (MHWS)<sup>1</sup>). The offshore carbon dioxide pipeline will also require consent under the Petroleum Act 1998.
- 24.2.5 As both the onshore and offshore elements will potentially be constructed at the same time, there is the potential for combined effects associated with the construction works, or effects which are more significant when both the onshore and offshore schemes are constructed together.
- 24.2.6 The need for a combined effects assessment is recognised in the Overarching National Policy Statement (NPS) for Energy (EN-1) (DECC, 2011) and is in accordance with the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations') (as amended). The consideration of cumulative and combined effects is also required under the Marine Works Environmental Impact Assessment Regulations (2007, as amended) and the Offshore Oil and Gas

<sup>1</sup> The onshore and offshore consenting regimes overlap between MHWS and MLWS.

Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020.

24.2.7 This is a Statement of Combined Effects (SoCE) document which recognises the high-level principles of the EIA process and the need to consider the project as a whole. This document sets out a consideration of project-wide effects that may result from the concurrent development of both schemes.

24.2.8 In order to identify the potential for these effects to occur, this document provides a summary of the environmental setting of the onshore and offshore elements, the potential environmental effects and proposed mitigation. The potential for combined effects is then assessed. Given the early stage of design and assessment for the offshore development, the assessment of offshore environmental effects is of necessity at a high level. There is however a reasonable level of certainty around the nature of the offshore development and its potential impacts, which is sufficient to allow this assessment to be carried out, using professional judgment where necessary.

### Consultation

24.2.9 This document responds to feedback received from stakeholders during pre-application engagement and consultation on the Application for the onshore scheme. A brief summary of this feedback is provided in Table 24-C1.

**Table 24C- 1: Onshore Scheme - Consultation Summary**

Consultee	Date	Summary
Planning Inspectorate (DCO Scoping Opinion)	02.04.19	[...] The ES should identify other developments with the potential to impact on sensitive receptors (including, where appropriate, the Offshore works of the Teesside Cluster Carbon Capture & Usage Project [now the Net Zero Teesside project]) together with the Proposed Development. Any likely significant cumulative effects should be assessed [...].
Marine Management Organisation (DCO Scoping Opinion)	22.03.19	The EIA Scoping Report covers the onshore works associated with the Project only, with onshore works described as those works that take place up to MLWS. The Scoping Report further notes that Offshore works, including the sub-sea [CO <sub>2</sub> ] pipeline and storage site, will be assessed under a separate Scoping Report [...]. It is very unclear from the Scoping Report what the intention is moving forward through the EIA process. While the Scoping Report notes that the onshore and Offshore works will be split with regards to scoping considerations, one Environmental Statement should be produced which considers the impacts of the Project as a whole [...].
Natural England (DCO Stage 2 Consultation)	17.09.20	[...] A full consideration of the implications of the whole Proposed Development should be included in the ES. All supporting infrastructure should be included within the assessment. The ES should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. The following types of projects should be included in such an assessment, (subject to available information) [...] plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects [...].

Consultee	Date	Summary
Public Health England (DCO Stage 2 Consultation)	18.09.20	Identify cumulative and incremental impacts (i.e. assess cumulative impacts from multiple sources), including those arising from associated development, other existing and proposed development in the local area [...].
Marine Management Organisation (DCO Stage 2 Consultation)	10.08.20	The MMO consider that potential cumulative impacts from current projects within the vicinity of the proposed scheme have been adequately addressed (Table 24-4) [...].

## Assessment of Combined Effects

24.2.10 The combined effects assessment of the Proposed Development and offshore scheme considers environmental receptors which could be affected by effects arising from both of those schemes, and have been assessed on the basis of:

- the information contained in the rest of this Environmental Statement (ES) which accompanies the Application for the onshore scheme; and
- the available environmental information and preliminary environmental data held by the Applicants for the offshore scheme.

24.2.11 The assessment takes into account the mitigation which has already been designed into the Proposed Development (onshore scheme) and that which is currently anticipated to be adopted for the offshore scheme to prevent, reduce or offset potential adverse effects. Full details of mitigation relevant to the onshore elements are provided within the ES (Appendix 25A: Commitments Register, ES Volume III, Document Ref. 6.4) which supports the Application for the Proposed Development.

24.2.12 The Proposed Development has progressed through a preliminary engineering design appraisal and EIA process whereas for the offshore scheme, preliminary engineering and design only have been undertaken, with the consenting applications to be prepared and submitted in 2021/2022. For this reason, the nature, scale and level of detail associated with the onshore and offshore schemes differs.

### Construction

24.2.13 Significant effects associated with the combined construction of the onshore and offshore schemes in their entirety are considered highly unlikely. Based on a review of the available information, it is considered that combined construction impacts would only be likely in the overlapping Zone of Influence in the marine environment of the Tees Bay. This is therefore the focus of the assessment.

### Operation

24.2.14 Following construction of the Proposed Development (onshore scheme), the primary operational activity within the Tees Bay is the presence of the CO<sub>2</sub> Export Pipeline and ongoing operational discharges of treated effluent through the water discharge corridor under an Environmental Permit. For the offshore scheme, the only operational activity within the vicinity of the Tees

Bay is the presence of the offshore extent of the CO<sub>2</sub> Export Pipeline; all other operational activities, including those related to the geological store, are approximately 145 km to the south-east.

- 24.2.15 Based on the Zones of Influence associated with the onshore and offshore schemes and the nature of activities during operation, this assessment assumes that combined effects would only occur during the construction phase and that the assessment of combined operational effects can be scoped out of the assessment.

### Decommissioning

- 24.2.16 At the end of its operating life, it is anticipated that all above-ground equipment associated with the onshore scheme will be decommissioned. A Decommissioning Plan (including Decommissioning Environmental Management Plan (DEMP)) will be produced and agreed with the Environment Agency as part of the Environmental Permitting and site surrender process; this will include coverage of the CO<sub>2</sub> export facilities, in so far as they form part of the Proposed Development, down to MLWS. The DEMP will consider in detail all potential environmental risks and contain guidance on how risks can be removed, mitigated or managed.
- 24.2.17 The decommissioning process for the offshore scheme has not yet been considered as part of an environmental assessment process. However, as part of any future EIA for the offshore scheme, decommissioning will be considered in detail, including future decommissioning requirements to help inform the scheme design.
- 24.2.18 Similarly to the Proposed Development (onshore scheme), a Decommissioning Plan for the offshore scheme will be secured through the relevant regulatory process (i.e. OGA Carbon Dioxide Appraisal and Storage Licence and Permit, the Petroleum Act 1998 and, depending on regulatory requirements, the Marine and Coastal Access Act 2009). The Decommissioning Plan will include an Environmental Appraisal which would require approval by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), in line with the requirements of the Petroleum Act 1998. Plan requirements have not been confirmed but may involve the removal or repurposing of infrastructure above the surface of the seabed and/or the termination, capping and closure of operational infrastructure to make-safe.
- 24.2.19 Based on the available information for the onshore scheme and the anticipated nature of decommissioning for the offshore scheme, decommissioning effects are not predicted to be greater than any of those associated with construction. Furthermore, for both the onshore scheme and the offshore scheme, there are existing regulatory processes in place to effectively consider, and where necessary manage, any residual environmental effects at an appropriate future date. On this basis, combined decommissioning effects are therefore scoped out of the assessment.

## 24.3 Overview

### Onshore Scheme

24.3.1 A detailed description of the Proposed Development is provided within Chapter 4: The Proposed Development (ES Volume I, Document Ref. 6.2). For the purposes of this document, the key components of the onshore scheme are as follows:

- the Low-Carbon Electricity Generating Station and associated utility connections (electricity, natural gas, water supply and discharge); and
- industrial CO<sub>2</sub> Gathering Network, High Pressure Compression facilities and CO<sub>2</sub> Export Pipeline to below MLWS.

24.3.2 The Proposed Development above MLWS is classed as a Nationally Significant Infrastructure Project under the Planning Act 2008 (as amended). In line with the recommendations of the Planning Inspectorate and the MMO, a 'deemed' Marine Licence is included within the draft DCO for those parts of the onshore development below MHWS, so that a separate consent under the Marine and Coastal Access Act 2009 is not required.

24.3.3 These components, which are the responsibility of NZT Power and NZNS Storage, are referred to as the 'Onshore Scheme' to be consented by a DCO, with a Deemed Marine Licence (DML) for elements below MHWS. The status of the Proposed Development (onshore scheme) is that it is the subject of the Application which has been submitted to PINS.

### Offshore Scheme

24.3.4 Net Zero Teesside and Zero Carbon Humber together form the Northern Endurance Partnership (NEP) which has been established to help progress strategic proposals for the transport and storage of CO<sub>2</sub> in the North Sea (see Diagram 24C-1). These strategic proposals include two CO<sub>2</sub> export pipelines from Humberside and Teesside to the Endurance Store. The offshore CO<sub>2</sub> export and storage elements of the NZT below MLWS will be separately consented and do not form part of the onshore scheme. This includes the offshore section of the 145 km long CO<sub>2</sub> Export Pipeline from Teesside and also the 85 km pipeline from Humberside, together with the Endurance CO<sub>2</sub> store itself, CO<sub>2</sub> injection wells into the store and the associated offshore infrastructure (either platform, subsea or combination thereof).

24.3.5 These components, which are the responsibility of NZNS Storage, are referred to as the 'Offshore Scheme'. Diagram 24C-1 below provides an overview of these proposals.

24.3.6 In support of the submission of an Environmental Statement for the offshore scheme, the NEP completed an offshore Environmental Baseline Survey in 2020 with further survey activity ongoing in 2021. In 2020, environmental data acquisition was carried out at 23 environmental stations across the Endurance Geological Store area and at an associated underwater outcrop formation, referred to as the 'Bunter Outcrop', 20 km east of the Endurance store structure. Environmental data collection objectives were to:

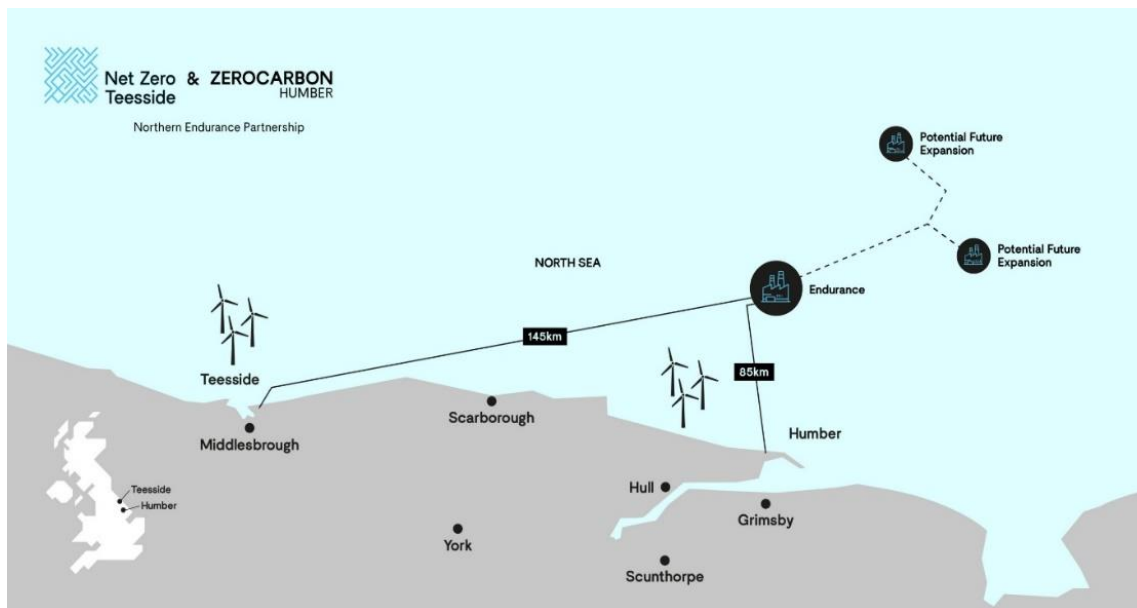


- determine characteristics of seabed sediments;
- determine water column characteristics through the collection of hydrographic profiling data and water samples;
- characterise benthic communities (infauna and epifauna); and
- provide an assessment of likely habitats and biotopes and the presence of environmentally sensitive species and habitats.

24.3.7 Survey data collected at the environmental stations included seabed imagery acquisition, benthic grab samples and water quality data.

24.3.8 Ongoing environmental baseline data collection is being undertaken in 2021 for the indicative Teesside and Humber side CO<sub>2</sub> Export Pipeline routing corridors. This has commenced with the acquisition of Multibeam Echo Sounder (MBES) and Side-scan sonar (SSS) bathymetry data. The processed data will be used to identify potential environmental features of interest on the sea floor and to inform further environmental station location selection along the pipeline routing corridors. These environmental stations will then be targeted for the collection of seabed imagery acquisition, benthic grab samples and water quality data. Where environmental data is available (i.e. from earlier sampling and survey work in 2020), this has been used to inform this assessment.

**Diagram 24C- 1: Overview of NEP Proposals**



## 24.4 Environmental Baseline (onshore and offshore)

24.4.1 A summary of the relevant environmental baseline for the onshore and offshore schemes is provided within Table 24C-2 and Table 24C-3. Figure 24C-1 provides a strategic overview of environmental constraints whilst Figure 24C-2 provides a more focused review of overview of key environmental constraints within the Tees Bay and immediate surrounds.

**Table 24C- 2: Summary of Environmental Constraints (Onshore Scheme)**

Topic	Key Environmental Constraints / Receptors
Air Quality	Based on IAQM guidance (IAQM, 2014), during the construction phase receptors potentially affected by dust soiling and short-term concentrations of PM <sub>10</sub> generated during construction activities are limited to those located within 350 m of the nearest construction activity, and/ or within 50 m of a public road used by construction traffic that is within 500 m of the construction site entrances. Ecological receptors are limited to those located within 50 m of the nearest construction activity and/ or within 50 m of a public road used by construction traffic that is within 500 m of the construction site entrances. Receptors potentially affected by the exhaust emissions associated with construction phase vehicle movements are those located within 200 m of a public road used by construction traffic to access the site. Ecological receptors potentially affected by operational emissions have been identified and primarily include the Teesmouth and Cleveland Coast Ramsar, SPA and SSSI. Further details of these sites and reasons for designations are provided in Chapter 12: Terrestrial Ecology and Nature Conservation (ES Volume I, Document Ref. 6.2). Identified receptors are detailed in full within Chapter 8: Air Quality (ES Volume I, Document Ref. 6.2).
Surface Water, Flood Risk and Water Resources	Using observations taken from site visit(s), data from OS mapping and the Environment Agency Catchment Data Explorer website, a summary of the surface waterbodies and where relevant to the assessment, groundwater waterbodies, was compiled which include the Tees Estuary, Tees Bay and a number of minor watercourses on the north and south bank of the Tees. Details relating to additional constraints for surface water, flood risk and hydrogeology can be found within Chapter 9: Surface Water, Flood Risk and Hydrogeology (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Figures (ES Volume III, Document Ref. 6.4).
Geology & Hydrogeology	Sensitive land uses identified within and surrounding the onshore scheme include the Teesmouth and Cleveland Coast Ramsar, SPA, SSSI. Man-made ground is present throughout much of the Proposed Development Site overlying superficial deposits including blown sand and tidal flat deposits (secondary aquifers) and glacio-lacustrine deposits and glacial till (non-aquifers). Underlying (bedrock) geology can be summarised as Redcar Mudstone Formation (Non-aquifer), Penarth Group (Mudstone), Mercia Mudstone Group (Secondary Aquifer)) and Sherwood Sandstone Group (Principal Aquifer). For further details, please refer to Chapter 10: Geology and Contaminated Land (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).
Noise & Vibration	Key NSR locations considered to be representative of the nearest and likely most sensitive receptors to the onshore Scheme have been identified as a number of residential properties in Redcar, Warrenby, Billingham, Haverton Hill and offices at Bran Sands and Seal Sands, in addition to the ecological receptors discussed below.
Terrestrial Ecology and Nature Conservation	The terrestrial ecology features relevant to the onshore scheme are considered in full within Chapter 12: Terrestrial Ecology and Nature Conservation (ES Volume I), supporting Appendices (ES Volume III) and supporting Figures (ES Volume II). Relevant terrestrial ecology features are those considered to be of borough or higher nature conservation value, as well as features of local value where they are considered important for purposes of ensuring no net loss of biodiversity. Details of Local Wildlife Sites as well as other relevant habitats and species as informed by survey activity and desk-based assessment are provided within Chapter 12: Terrestrial Ecology and Nature Conservation (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).
Aquatic Ecology	The aquatic ecology features relevant to the onshore scheme are detailed in Chapter 13: Aquatic Ecology (ES Volume I, Document Ref 6.2) and include aquatic ecology features considered to be of Borough or higher nature conservation value, as well as features of local value where they are considered important for the purposes of ensuring no net loss of biodiversity. Waterbodies scoped in for the assessment of construction and

Topic	Key Environmental Constraints / Receptors
	decommissioning impacts are those within the Site required for construction of the other Connections and within 50 m of the PCC Site. Further details are provided within Chapter 13: Aquatic Ecology (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).
Marine Ecology	<p>The marine ecological baseline relevant to the onshore scheme is detailed within Chapter 14: Marine Ecology (ES Volume I, Document Ref. 6.2) The key environmental constraints considered of key relevance to the onshore Scheme are summarised below:</p> <p><b>Designated Sites:</b> Teesmouth and Cleveland Coast SPA / Ramsar / SSSI and Southern North Sea SAC</p> <p><b>Plankton:</b> Phytoplankton and Zooplankton</p> <p><b>Intertidal habitats and communities:</b> Includes sand and mudflats and rocky shore</p> <p><b>Subtidal habitats and communities:</b> Includes all subtidal habitats and non-commercial invertebrate species</p> <p><b>Fish and shellfish:</b> Migratory fish species (including Atlantic salmon, European eel, sea trout and lamprey); Commercial fish and shellfish species; General fish and shellfish</p> <p><b>Marine mammals:</b> Cetaceans and pinnipeds</p> <p>Further details are provided within Chapter 14: Marine Ecology (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).</p>
Ornithology	<p>Relevant ornithological features are all of those considered to be of borough or higher nature conservation value, as well as features of local value where they considered important for purposes of ensuring no net loss of biodiversity. Ornithological receptors can be coarsely divided into ornithological features of Designated Sites, individual species and species assemblages. The key ornithological features, and their characteristics, identified as contributing to the baseline are principally the Teesmouth and Cleveland Coast SPA and Ramsar, the Saltholme RSPB Reserve (located 1.15 km west of the PCC, noting that the majority of the reserve is located on the northern bank of the Tees, approximately 6km to the west of the PCC) and Coatham Marsh LWS. The close association of offshore marine, intertidal, non-tidal coastal, onshore wetlands and terrestrial habitats within the Teesside area are attractive to a wide range of birds. Further details are provided within Chapter 15: Ornithology (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).</p>
Traffic and Transportation	<p>The highway links which form the agreed highway network of interest for the Traffic and Transportation assessment for the Onshore Scheme are the A Road and minor road links which connect the site to the Trunk Road network (A1 and A19). Full details are provided within Chapter 16: Traffic and Transportation (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).</p>
Landscape and Visual Amenity	<p>Overall, the Study Area is characterised by industry, including existing Power Stations, petrochemical manufacturing facilities and former steel works. These large-scale developments are key characteristics influencing the landscape character. The elevated land to the south of the Study Area allows for wide ranging views, but this landform along with extensive tree cover restricts views of the industrial structures from further afield. A comprehensive account of baseline conditions and key environmental receptors is provided within Chapter 17: Landscape and Visual Amenity (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).</p>
Archaeology and Cultural Heritage	<p>There are no scheduled monuments, registered parks and gardens, or conservation areas within the onshore scheme site nor are there any protected wrecks within the site down to MLWS. The baseline assessment has identified 491 designated heritage assets within the 5 km Study</p>

Topic	Key Environmental Constraints / Receptors
	<p>Area. The assets include 23 scheduled monuments, one registered park and garden and one protected wreck, and 17 conservation areas. The number of designated assets also include 451 listed buildings, of which 10 are Grade I listed, 37 are Grade II* listed and 404 are Grade II listed. A palaeochannel located between South Gare and Coatham Rocks has been recorded adjacent to the Site boundary and just beyond the northern edge of the Study Area. The palaeochannel represents an earlier course of the River Tees, or one of its tributaries, and has the potential to contain palaeoenvironmental data which could provide important evidence relating to the environmental conditions of the area during the early prehistoric period. Despite not being recorded in available borehole data, there is potential for organic material such as peat to be present within the alluvium deposits that are present on either side of the estuary and along the coastline. Further details, including a detailed account of the Archaeological and Historical Background of the Study Area, is provided within Chapter 18: Archaeology and Cultural Heritage (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).</p>
Marine Heritage	<p>There are no designated assets related to submerged prehistoric archaeology or palaeolandscapes within the Study Area down to MLWS for the onshore Scheme. There is one undesignated asset related to submerged prehistoric archaeology or palaeolandscapes within the Water Connection Corridor. The palaeochannel is contemporary to the early Holocene Hartlepool and Redcar submerged forests and peat beds. This known pre-existing marine heritage is of regional importance as set out in the North-East Regional Research Framework (Petts and Gerrard, 2006), therefore by association, this asset is assessed to be of medium value. There are no designated shipwrecks within the Study Area. The closest designated asset is a protected shipwreck (List no. 1000077) located off Seaton Carew, 4.2 km west of the Site boundary. Further details, including a detailed account of the Archaeological and Historical Background of the Study Area, is provided within Chapter 18: Marine Heritage (ES Volume I) and supporting Appendices. (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).</p>

**Table 24C- 3: Summary of Environmental Constraints (Offshore Scheme)**

Topic	Key Environmental Constraints / Receptors
Air Quality	<p>Unlike the onshore scheme, no key ecological or human receptors have been identified for Air Quality arising from the offshore scheme. It is anticipated that any construction-phase effects would be short-term and negligible with any residual impacts being managed effectively through best-practice and existing regulatory measures (including those related to vessel performance).</p>
Surface Water, Flood Risk and Water Resources	<p>The nearshore part of the offshore scheme is within the vicinity of a single waterbody – ‘Tees Bay’ – which is a Coastal waterbody. The Environment Agency’s Catchment Data Explorer website confirms that the estuarine and coastal waterbodies in the vicinity of the . Scheme are contained within the Northumbrian River Basin District, the Northumbrian Transitional and Coastal (‘TraC’) Management Catchment, and the Tees Lower and Estuary TraC Operational Catchment.</p>
Physical Environment	<p>The offshore scheme begins at the Endurance Store area located within the Southern North Sea (SNS) Marine Natural Area (MNA) and also crosses north west through the SNS MNA and into the Mid North Sea (MNS) MNA. These ecoregions were identified by Natural England together with the Joint Nature Conservation Committee based on the underlying geology, natural systems and physical processes.</p>

Topic	Key Environmental Constraints / Receptors
	<p>The SNS MNA extends south from the Flamborough front to a boundary north of the Dover Strait, with a transition from North Sea water to Atlantic water. Currents in the North Sea circulate in an anti-clockwise direction, driven by inflows from the Atlantic via the northern North Sea down the UK east coast and from the English Channel, and outflow northwards along the Norwegian coast. Against this background of tidal flow, the direction of residual water movement in the SNS MNA is generally to the east (DTI, 2001; DECC, 2016). There are significant local variations in patterns of semi-diurnal tidal and residual circulation which occur in the vicinity of sandbanks.</p>
Seabed Features and Sedimentology	<p>The SNS MNA has many extensive sandbanks present at less than 25 m depth, including areas which have been designated under the EU Habitats Directive as ‘sandbanks which are slightly covered by sea water at all times’, such as Dogger Bank SAC and the North Norfolk Sandbanks SAC. Sandbanks provide a home to many species including burrowing fauna such as polychaete worms, crustaceans, bivalve molluscs and echinoderms. Mobile epifauna at the surface of the sandbanks may include shrimps, gastropod molluscs, crabs and fish. Sandeels (are an important food for birds and inhabit sandy sediments, which are the dominant sediment type for this habitat. Within the SNS MNA, seabed substrates generally consist of sandy gravel close to the shore, whereas further Offshore the sediments mainly consist of sand with patches of gravel, sandy mud and sandy gravel. Likewise, according to UKOOA (2001), the southern sector tends to have coarser sediments with a relatively low proportion of silt/clay. Within the MNS MNA, the Offshore seabed is composed predominantly of sand with some gravelly sand and muddy sand patches. Closer inshore, the sediment has a higher proportion of mud. The nearshore seabed is composed of an assortment of mixed sediments, with more muddy and sandy gravel and fewer areas of sand. Where gravelly sediments are consolidated and stable, an associated rich fauna more characteristic of rocky areas can develop. In the nearshore zone there are also occasional and sometimes extensive exposures of bedrock and boulder reefs. The Offshore Scheme crosses an area of approximately 25k m<sup>2</sup> of potential Annex I bedrock and/or stony reef. The EUSeaMap 2019 is a broad-scale seabed habitat map covering European waters, which uses the European Nature Information System (‘EUNIS’) habitat classification and Marine Strategy Framework Directive (MSFD) predominant habitat classification systems. Within the vicinity of the Offshore Scheme, EUSeaMap describes a wide range of habitats, with a total of fifteen EUNIS habitats predicted to occur along the likely route corridor as well as small areas of unknown habitat close to shore. Deep circalittoral sand deep circalittoral coarse sediment are predicted as the most widespread habitats, with the former more widespread Offshore and the latter most widespread closer to shore.</p>
Planktonic Communities	<p>Plankton forms the basis of marine ecosystem food webs and the composition of plankton communities is temporally variable, depending on circulation patterns of water masses, time of year and nutrient availability. The distribution and abundance of plankton is heavily influenced by water depth, tidal mixing and thermal stratification within the water column. During spring blooms large diatoms such as <i>Thalassiosira spp.</i> and <i>Chaetoceros spp.</i> are dominant. The spring bloom is followed by an increase in the abundance of zooplankton feeding on the phytoplankton bloom.</p>
Benthic Ecology	<p>As a result of the mosaic of different sediment types within the SNS MNA, a wide variety of habitats are present in this region. In terms of broad community distribution, four main communities have been distinguished offshore. Fine sands in more than 50 m are typified by polychaetes such as <i>Ophelia borealis</i> and <i>Nephtys longosetosa</i>, while muddy fine sands in 30 m to 50 m are typified by the bivalve <i>Nucula nitidosa</i>, the shrimp <i>Callinassa subterranean</i> and the cumacean crustacean <i>Eudorella truncatula</i>. Coarser sediments in less than 30m are typified by two communities, the first with the polychaete <i>Nephtys cirrosa</i>, the sea urchin <i>Echinocardium cordatum</i> and the amphipod crustacean <i>Urothoe poseidonis</i>. The second by the polychaetes <i>Anoides paucibranchiata</i> and <i>Pisione remota</i>, and the amphipod crustacean <i>Phoxocephalus holbolli</i>. Closer inshore the likely route corridor for the Offshore Scheme crosses an area of approximately 25 km<sup>2</sup> of potential Annex I bedrock and/or stony. Reefs within the MNS MNA are moderately exposed to wave action and only occur close to the shore in the shallow sublittoral. Together with those found in the intertidal, they form the most diverse examples of reefs on the North Sea coast (Brown et al., 1997). A large number of the species</p>

Topic	Key Environmental Constraints / Receptors
	<p>present are characteristic of cold water, such as the anemone <i>Bolocera tuediae</i> and the bottlebrush hydroid <i>Thuiaria thuja</i>. Further inshore towards Teesside, muddier sediments have been found to prevail, and were characterised by the presence of <i>Nephrops norvegicus</i> and a reduced frequency of sessile species. Additionally, the brown shrimp <i>Crangon crangon</i> and the pink shrimp <i>Pandalus montagui</i> have been detected in these coastal waters, both of which are commonly encountered within estuaries as well as coastal waters (Rees et al., 1999).</p>
Fisheries	<p>The North Sea in general is a very important area for populations of several commercial fish species, providing spawning grounds and nursery and feeding areas. Major UK and international fishing fleets operate in the southern, central and northern North Sea and target both pelagic and demersal fish stocks. One of the most important fisheries in the North Sea is the mixed demersal fishery that targets cod, haddock and whiting in the central and northern parts of the region. Fish are also the main prey for most marine bird species. Among the most important are sandeel, herring, sprat and mackerel. Sandeels are also one of the main prey items for harbour porpoise, grey seals and are also an important prey species for predatory fish such as whiting, cod and haddock; some of which may also be prey for harbour porpoise and seals.</p> <p>The Endurance Store survey area is located within International Council for the Exploration of the Seas (ICES) rectangles 37F0 and 37F1 and the likely corridor for the Offshore Scheme is within ICES 37F0, 37E9, 38E9 and 38E8. According to fishing data from the Scottish Government (2019), ICES 37F0, 37E9 and 38E9 are targeted mainly for shellfish. Based on provisional statistical data from 2018, shellfish accounted for over 90% of the live-weight tonnage and over 90% of the value fished. Correspondingly, within these ICES rectangles, pelagic and demersal species together accounted for &lt;10% live-weight tonnage and value. In terms of species, crabs and scallops contributed most to the live-weight tonnage. The remaining ICES rectangles, 37F1 and 38E8, are targeted predominantly for shellfish and demersal species.</p>
Ornithology	<p>The MNS and SNS MNAs are important for marine birds, with 32 and 33 species that regularly occur, respectively. The varied coastline adjacent to these Natural Areas provide suitable nesting habitat for a wide range of marine bird species: cliff grasslands are home to species including puffin (<i>Fratercula arctica</i>) and several species of gull and tern, whilst rugged cliffs, pinnacles and islands present ideal nesting conditions for fulmar (<i>Fulmarus glacialis</i>), guillemot (<i>Uria aalge</i>) and razorbill (<i>Alca torda</i>). Shag (<i>Phalacrocorax aristotelis</i>) tend to prefer the gentler boulder-strewn slopes, whilst terns and gulls' nest also on sparsely vegetated upper foreshore. Many species of fish taken as prey by marine birds require a sandy substratum with rapid water circulation in which to spawn. There are two major sandbank systems in the SNS MNA which provide such conditions; the Dogger Bank in the north and the Brown Ridge located off the Norfolk coastline. These sandbanks also cause tidal upwellings, which concentrate zooplankton and the fish that prey upon them (Alldredge &amp; Hammer, 1980). The Joint Nature Conservation Commission (JNCC) has released the latest analysed trends in abundance, productivity, demographic parameters, and diet of breeding seabirds, from the Seabird Monitoring Programme (JNCC, 2020). This data provides at-a-glance UK population trends as a percentage of change in breeding numbers from complete censuses. From the years 2000-2018, the following population trends for the species that are likely to be encountered during the NEP Survey One, for which information was available, have been recorded: arctic tern (-13%), arctic skua (-70%), common tern (+15%), cormorant (-7%), fulmar (-38%), gannet (+41%), guillemot (+1%), kittiwake (-50%), razorbill (+33%) and shag (-24%). Out of the top ten most likely seabird species to be encountered during the operations, three (arctic tern, fulmar and kittiwake) show a decline in population between 2000-2018.</p>
Marine Mammals	<p>Twenty-eight cetacean species have been recorded in UK waters from sightings and strandings. Of these, eleven species are known to occur regularly, while seventeen are considered rare or vagrant. Of these regular species, only seven cetaceans are likely to be encountered within the central and southern North Sea; Atlantic white-sided dolphin (<i>Lagenorhynchus albirostris</i>), bottlenose dolphin (<i>Tursiops truncatus</i>), harbour porpoise, minke whale (<i>Balaenoptera acutorostrata</i>), long-finned pilot whale (<i>Globicephala melas</i>), short-beaked common dolphin (<i>Delphinus delphis</i>), and white-beaked dolphin (<i>Lagenorhynchus albirostris</i>). The Endurance Store area and first few kilometres (Offshore) of the likely corridor for the</p>

Topic	Key Environmental Constraints / Receptors
	<p>Offshore Scheme are located within the SNS SAC designated for harbour porpoise and can therefore be considered a significant area for feeding, breeding, nursery or migrating harbour porpoise. To ensure the integrity of the SAC is maintained and it poses the best possible contribution to maintaining a favourable conservation status for harbour porpoise the following conditions are required: maintain harbour porpoise as a viable component of the SAC, ensure there is no significant disturbance of the species, and the condition of supporting habitats and processes, and the availability of prey are maintained.</p>
Other Sea Users	<p>There is a long history of oil and gas activity in the North Sea, with oil being discovered in the early 1960s and the first well coming online in the early 1970s. Gas activities are most common in the SNS, whilst both oil and gas are found in the central and northern areas. There are fourteen existing wells and two pipelines present within the Endurance Store survey area including those associated with the Garrow NUI platform. Along the Humber PRC there are two wells and eleven pipelines, while along the Teesside PRC there are three wells and five pipelines. Therefore, there is a high likelihood of production/storage operations to be ongoing during the planned works. The military use of the coasts and seas of the UK is extensive with all three services (army, air force, navy) having defined Practice and Exercise Areas (PEXAs), some of which are danger areas where live firing and testing may occur. Additionally, several radars making up the Air Surveillance and Control Systems (ASACS) are present around the coasts of the UK.</p> <p>Although PEXA charts, produced by the UK Hydrographic Office, show the Endurance Store area and PRCs to occur within areas of intense aerial activity (AMDS, 2021), the proposed operations are not expected to conflict with military aerial activities. Cables UK-Germany 6 and TGN Northern Europe both intersect the Teesside PRC at approximately 47km and 51km, respectively from the start point (within the Endurance Store area). No cables cross the Endurance Store area or Humber PRC.</p> <p>There are 29 UK Offshore wind farms situated either wholly within or within 26km of the boundary of the SNS SAC (The Crown Estate, 2021), which is a distance the JNCC have identified that harbour porpoise may be displaced from due to sound arising from pile-driving or unexploded ordnance detonation (JNCC, 2017). Additionally, there are four windfarms within Belgium Offshore waters and one windfarm in Dutch Offshore waters, situated within 26km of the SNS SAC (EMODnet, 2020a). Out of the 34 windfarms situated within 26km of the SNS SAC, three wind farms (Triton Knoll, East Anglia One and Hornsea Project Two) are currently undergoing construction activities Offshore. All other wind farms are either operating, consented but not started Offshore construction, or have submitted applications and are awaiting determination.</p>
Shipping and Navigation	<p>The North Sea contains some of the world's busiest shipping routes, with significant traffic generated by vessels trading between ports at either side of the North Sea and the Baltic. North Sea oil and gas fields generate moderate vessel traffic in the form of support vessels, principally operating from Peterhead, Aberdeen, Montrose, and Dundee in the north and Great Yarmouth and Lowestoft in the south (UKHO, 2013), which in turn results in busy port approaches at these locations. In recognition of vessel traffic densities and topographic constraints on various routes, the International Maritime Organisation (IMO) has established a number of traffic separation schemes and other vessel routine measures to reduce risks of ship collision and groundings. In addition, IMO regulations have required that from 2005, an automatic identification system (AIS) transponder be fitted aboard all ships of &gt;300 gross tonnage engaged on international voyages, all cargo ships of &gt;500 gross tonnage and all passenger ships irrespective of size. The AIS allows precise tracking of individual vessels, however, has a limited range and limited coverage of smaller vessels (e.g., small commercial and fishing vessels and recreational users). Such vessels are starting to carry AIS equipment (AIS-B) and therefore understanding of their movements is improving.</p>

## 24.5 Effects and Mitigation Review

- 24.5.1 Based on the EIA carried out for the onshore scheme, a range of potential construction impacts have been identified and mitigation and management measures proposed which will be included within the Final Construction Environmental Management Plan; this will be secured by a requirement within the draft DCO and a Framework CEMP is included in the ES (Appendix 5A, ES Volume III, Document Ref. 6.4).
- 24.5.2 A range of additional mitigation measures would be employed associated with the operational impacts from the onshore scheme; as noted above, this assessment is focused on construction-phase impacts only and as such, no reference to operational mitigation is made.
- 24.5.3 As described above, the onshore scheme has progressed through early engineering design development and the EIA process whereas the offshore scheme is currently going through preliminary engineering design and associated offshore surveys. The level of information available for each scheme reflects this difference.
- 24.5.4 Table 24C-4 and Table 24C-5 below provide a review of potential effects and mitigation for the onshore scheme and the offshore scheme respectively.



**Table 24C- 4: Effects and Mitigation Review (Onshore Scheme)**

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
Air Quality	<ul style="list-style-type: none"> <li>dust from demolition and construction activities;</li> <li>emissions from construction vehicles and mobile construction plant; and</li> <li>emissions from construction phase road traffic (using traffic data in the form of traffic flows, composition and speed).</li> </ul>	<p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Air Quality specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>cutting and grinding operations, if required, will be conducted using equipment and techniques that reduce emissions and incorporate appropriate dust suppression measures</li> <li>damping down of dust-generating equipment and vehicles within the Site and the provision of dust suppression in all areas of the Site that are likely to generate dust</li> <li>employ wheel wash systems at site exits</li> <li>minimising duration of storage of topsoil or spoil during pipeline construction; and</li> <li>materials stockpiles likely to generate dust will be enclosed or securely sheeted, damped down or stabilised as appropriate.</li> </ul>
Surface Water, Flood Risk and Water Resources	<ul style="list-style-type: none"> <li>temporary impacts on surface water quality such as those associated with pollution and changes in Suspended Sediment Concentration (SSC);</li> <li>temporary impacts on morphology of the Tees and other waterbodies; and</li> <li>increase in surface water and groundwater flood risk as a result of increased surface water and below ground installations</li> </ul>	<p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Surface Water, Flood Risk and Water Resources specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>all reasonably practicable measures will be taken to prevent the deposition of fine sediment or other material in any existing waterbody, arising from construction activities following the EAs GPP pollution prevention guidelines where required.</li> <li>a temporary drainage system will be developed to prevent runoff contaminated with fine particulates from entering surface water drains without treatment.</li> <li>appropriately sized runoff storage areas for the settlement of excessive fine particulates in runoff will be provided.</li> <li>topsoil and other construction materials will be stored outside of the 1 in 200-year floodplain extent and only moved to the temporary works area immediately prior to use.</li> <li>connectivity will be maintained between the floodplain, the River Tees and Greatham Creek.</li> <li>the Contractor will monitor weather forecasts on a regular basis and plan works accordingly.</li> </ul>

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
Geology and Hydrogeology	<ul style="list-style-type: none"> <li>• mobilisation of contaminants during remediation and construction;</li> <li>• changes to hydrogeological regimes (e.g. during dewatering activities);</li> <li>• changes to surface water quantity and quality; and</li> <li>• depletion of / detrimental impacts to soil resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction works undertaken adjacent to, beneath and within watercourses would comply with relevant guidance during construction, including the requirements of any Environmental Permit, Ordinary Watercourse Consent and IDB Bylaws.</li> </ul> <p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Geology and Hydrogeology specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>• prior to the design and construction of the project, a ground investigation ('GI') will be undertaken;</li> <li>• best practice measures will be adopted during construction to prevent or reduce as far as reasonably practicable spillage risk and spillage effects;</li> <li>• a Site Waste Management Plan ('SWMP') and Materials Management Plan ('MMP') will be implemented as part of the Final CEMP to provide suitable controls to facilitate the re-use of materials such as site won soils and crushed concrete;</li> <li>• the scheme development will actively work towards achieving an earthworks balance with spoil beneficially reused onsite where possible; and</li> <li>• specific mitigation measures (as outlined within the Framework CEMP, Appendix 5A, ES Volume III, Document Ref. 6.4) may be required in the form of treating/ remediating any contamination encountered during construction (e.g. any contamination that may be associated with any potentially contaminative sites identified as part of the assessment, notably the landfills and areas of potentially infilled land).</li> </ul>
Noise and Vibration	<ul style="list-style-type: none"> <li>• noise and vibration levels during site clearance, remediation, construction works;</li> <li>• predicted changes in road traffic noise levels on the local road network during the construction phase;</li> <li>• disturbance to residential receptors; and</li> <li>• disturbance to ecological receptors.</li> </ul>	<p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Noise and Vibration specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>• a scheme for the monitoring and control of noise and vibration during the construction will be implemented prior to commencement of construction;</li> <li>• ensuring that modern plant is used, complying with the latest noise emission requirements. Selection of inherently quiet plant where possible;</li> <li>• use of rotary bored rather the driven piling techniques (if required), where possible;</li> </ul>

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
Terrestrial Ecology and Nature Conservation	<ul style="list-style-type: none"> <li>temporary and/or permanent loss of habitat;</li> <li>disturbance to and/or displacement of ecological receptors and sensitive species adjacent to / within the onshore scheme site;</li> <li>contamination of habitat / deterioration of habitat; and</li> <li>introduction of invasive and non-native species.</li> </ul>	<ul style="list-style-type: none"> <li>use of screening locally around significant noise producing plant and activities where required;</li> <li>all vehicles used on-Site shall incorporate broadband reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance where reasonably practicable;</li> <li>noise complaints should be monitored, reported to the contractor and immediately investigated; and</li> <li>a detailed noise assessment will be carried out once the contractor is appointed and further details of construction methods are known, in order to identify specific mitigation measures (including construction traffic).</li> </ul> <p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Terrestrial Ecology and Nature Conservation specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>where reasonably practicable, routing of connection corridors is to utilise existing infrastructure, including the extensive existing network of pipeline racks, to minimise excavations and construction activities required and therefore minimise disturbance to species and habitats present;</li> <li>trenchless technologies will be utilised where reasonably practicable to minimise effects on habitats and species;</li> <li>a Habitat Management Plan and a Landscape and Biodiversity Strategy will be included within DCO application;</li> <li>standard best practice prevention measures will be applied for the prevention of surface and ground water pollution, fugitive dust management and noise prevention or amelioration;</li> <li>an Environmental or Ecological Clerk of Works (ECoW) would be present during construction;</li> <li>vegetation disturbance and removal will be undertaken from mid-April to October to coincide with the period when common lizards are likely to be active and able to disperse away from works areas;</li> <li>the Final CEMP will be accompanied by an Invasive Species Management Plan (ISMP);</li> </ul>

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
Aquatic Ecology	<ul style="list-style-type: none"> <li>• pollution of aquatic features and/or supporting habitats;</li> <li>• disturbance to receptors;</li> <li>• temporary impacts on water quality such as those associated with pollution and changes in SSC;</li> <li>• temporary and / or permanent loss of habitat; and</li> <li>• introduction of invasive and non-native species.</li> </ul>	<ul style="list-style-type: none"> <li>• where reasonably practicable, vegetation clearance works would be undertaken outside the bird breeding season, which is generally between March and August inclusive;</li> <li>• cleared ground would be maintained in a disturbed state in the run-up to construction commencing; and</li> <li>• construction temporary site lighting will be designed as far as reasonably practicable so as to minimise artificial light spill from the Site.</li> </ul> <p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Aquatic Ecology specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>• standard best practice prevention measures will be applied for the prevention of surface and ground water pollution, fugitive dust management and noise prevention or amelioration;</li> <li>• biosecurity measures will be put in place to reduce the spread of invasive non-native species; and</li> <li>• an Environmental or Ecological Clerk of Works (ECoW) would be present during construction.</li> </ul>
Marine Ecology	<ul style="list-style-type: none"> <li>• direct loss and physical disturbance to habitat and species;</li> <li>• physical disturbance to benthic habitats and species from increased suspended sediment concentrations (i.e. turbidity) and deposition;</li> <li>• indirect effects to marine ecology from changes in marine water quality (excluding turbidity);</li> <li>• changes in underwater soundscape;</li> <li>• changes in airborne soundscape; and</li> <li>• pollution of the marine environment during construction through accidental releases of fuels, oils, chemicals and other substances.</li> </ul>	<ul style="list-style-type: none"> <li>• appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Marine Ecology specifically, key construction mitigation includes:</li> <li>• potential re-use of the existing water discharge infrastructure from the former Redcar Steelworks shall be carried out where practicable to minimise land-take and the subsequent loss of benthic habitats and species, as well as to reduce disturbance to other marine ecological receptors;</li> <li>• trenchless technologies would be used where possible to install the CO<sub>2</sub> Export Pipeline and Water Discharge Corridor across the foreshore to minimise disturbance to benthic habitats and species;</li> <li>• pre-construction sediment contamination testing shall be carried out in consultation with the MMO;</li> </ul>

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
Ornithology	<ul style="list-style-type: none"> <li>temporary and/or permanent loss of habitat;</li> <li>disturbance to ecological receptors and sensitive species;;</li> <li>contamination of habitat / deterioration of habitat; and</li> <li>displacement of species.</li> </ul>	<ul style="list-style-type: none"> <li>the standard JNCC mitigation measures for explosives, piling and geophysical surveys (JNCC, 2010a; JNCC, 2010b; JNCC, 2017) shall be adopted during construction of the Proposed Development as appropriate;</li> <li>activities that generate impulsive underwater sound within the marine environment (i.e. piling) shall not be undertaken at night; and</li> <li>disposal of dredged material would be undertaken in accordance with deemed Marine Licences that will be secured by the DCO.</li> </ul> <p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Ornithology specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>to ensure legislative compliance in relation to nesting birds, all clearance of suitable vegetation during site preparation would be undertaken outside the breeding season (typically March-August inclusive for most species), where reasonably practicable;</li> <li>phasing of construction will be planned, where reasonably practicable, so that those activities with potential to cause noise and/or visual disturbance of receptors, and those that would result in habitat losses, are carried out at a time of year when the likelihood of birds being present is minimised;</li> <li>potential effects on barn owl will be avoided by siting infrastructure and working areas sensitively and by timing works where practicable to minimise disruption during the breeding season; and</li> <li>any works associated with construction of the proposed infrastructure that have the potential for significant noise or disturbance effects will not be undertaken during extreme weather conditions.</li> </ul>
Traffic and Transportation	<ul style="list-style-type: none"> <li>increased traffic flows on local road network.</li> </ul>	<p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Traffic and Transportation specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>implementation of the Construction Worker Travel Plan ('CWTP');</li> <li>the contractor will be responsible for managing how their workers travel to and from the Site;</li> </ul>

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
Landscape and Visual Amenity	<ul style="list-style-type: none"> <li>deterioration to neighbouring visual receptors;</li> <li>temporary and / or permanent changes to the landscape; and</li> <li>disturbance to neighbouring visual receptors through construction activities and lighting.</li> </ul>	<p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Landscape and Visual Amenity specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>suitable materials will be used, where reasonably practicable, in the construction of structures to reduce reflection and glare and to assist with breaking up the massing of the buildings and structures;</li> <li>the selection of finishes for the buildings and other infrastructure will be informed by the finishes of the adjacent developments in order to reduce the visual impact of the Proposed Development; and</li> <li>lighting required during the construction and operation stages of the Proposed Development will be designed to reduce unnecessary light spill outside of the Site boundary.</li> </ul>

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
Archaeology and Cultural Heritage	<ul style="list-style-type: none"> <li>with mitigation, detailed assessment concludes that there would be no impacts on archaeological remains or cultural heritage assets during construction.</li> </ul>	<ul style="list-style-type: none"> <li>appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Archaeology and Heritage specifically, key construction mitigation includes:               <ul style="list-style-type: none"> <li>implementation of a Written Scheme of Investigation;</li> <li>use of existing pipeline infrastructure, as far as is practicable, in order to avoid impacts to heritage assets;</li> <li>siting proposed connection corridor networks above ground where possible, thereby minimising impacts to potential buried archaeological remains;</li> <li>the use of trenchless technologies including bored tunnel, for the Natural Gas Connection and horizontal directional drilling (HDD) sections of the CO<sub>2</sub> Gathering Network; and</li> <li>physical impacts to the part of the former steel works conveyor located within the PCC Site should be mitigated via a proportionate programme of recording in advance of demolition.</li> </ul> </li> </ul>
Marine Heritage	<ul style="list-style-type: none"> <li>damage to marine heritage feature through construction activities in the Tees Bay.</li> </ul>	<p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Marine Heritage specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>assets should ideally be preserved in situ. Where this is not possible, an attempt must be made to preserve them by record.</li> <li>prior to construction, where practicable a geoarchaeological assessment should be undertaken to determine the extent of any peat deposits and paleoenvironmental features within the Site; and</li> <li>an appropriate archaeological mitigation strategy, for the identified impacts arising from construction, will be agreed (where possible) with the archaeological advisor to the local planning authority and, if applicable, Historic England</li> </ul>
Socioeconomics and Tourism	<ul style="list-style-type: none"> <li>increases in employment opportunities (i.e. beneficial);</li> <li>disturbance to local business;</li> <li>detrimental impacts to local tourism during construction through, for example, interruption to public rights of way; and</li> </ul>	<p>Appropriate standard and best practice control measures during construction are outlined in full in the Framework CEMP (Appendix 5A, ES Volume III, Document Ref. 6.4) and will be included in the Final CEMP. For Socioeconomics specifically, key construction mitigation includes:</p> <ul style="list-style-type: none"> <li>where reasonably practicable the project will seek to re-use existing infrastructure within the connection corridors</li> </ul>

Topic	Potential impacts that could act in combination with offshore works	Proposed mitigation measures for onshore scheme (The Proposed Development)
	<ul style="list-style-type: none"> <li>marine disturbance to other mariners within and around the Onshore Scheme site.</li> </ul>	<ul style="list-style-type: none"> <li>notice(s) to mariners (this is a published notice typically issued by a local harbour authority informing other marine users of marine works, their nature and duration);</li> <li>use of a Fisheries Liaison Officer (FLO) (this is an appointed single point of contact to liaise between the Marine Licence applicant and local commercial fishers);</li> <li>any temporary closures or diversions of public rights of way (or otherwise) required during construction would be implemented to maintain as much access as possible for users of these amenities due to their importance to local tourism; and</li> <li>it is anticipated that skills and education programmes and events will be provided by the contractor as mitigation</li> </ul>

**Table 24C- 5: Impacts and Mitigation Review (Offshore Scheme)**

Topic	Potential impacts that could act in combination with onshore works (the Proposed Development)	Potential mitigation measures to be considered for offshore scheme
Air Quality	<ul style="list-style-type: none"> <li>emissions from construction equipment and vessels;</li> <li>contamination of water bodies; and</li> <li>deterioration of localised air quality.</li> </ul>	<p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Air Quality specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>a detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures (where necessary);</li> <li>the offshore scheme vessel fleet emissions and their duration in the field will be optimised;</li> <li>All vessels involved in the offshore scheme will be subjected to a formal marine assurance process;</li> <li>rig mobilisation audits will be completed, as required;</li> <li>diesel consumption for offshore vessels will be subject to tracking and reporting;</li> <li>rig power management system(s) will be employed to minimise atmospheric discharges; and</li> </ul>



Topic	Potential impacts that could act in combination with onshore works (the Proposed Development)	Potential mitigation measures to be considered for offshore scheme
Community Disturbance	<ul style="list-style-type: none"> <li>disturbance to other local marine users;</li> <li>temporary restrictions to fishing grounds;</li> <li>navigational Risk; and</li> <li>disruption to recreational traffic.</li> </ul>	<ul style="list-style-type: none"> <li>the relevant Environmental Permit(s) will specify monitoring and control procedures to be used and set out a schedule of commissioning activities.</li> </ul> <p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Community Disturbance specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>a detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures (where necessary);</li> <li>application of Notices to Mariners / publication in Fishing News, as required;</li> <li>formal advertising to ensure awareness of works, as required;</li> <li>the Environmental &amp; Social Impact Assessment (ESIA) process is anticipated to include a formal public consultation process; this will allow interested parties / mariners to be informed on the proposals for the offshore scheme and have an opportunity to provide feedback to the applicant(s) / undertakers;</li> <li>a Stakeholder Management plan will be developed to ensure that technical feedback from relevant stakeholders is considered as part of the offshore scheme; and</li> <li>guard vessels will be employed during construction, as required.</li> </ul>
Aqueous Discharges / Oil and Chemical Leakage	<ul style="list-style-type: none"> <li>release of / disturbance of historical contaminants;</li> <li>accidental release of fuels, chemicals, and other contaminants leading to pollution of the Marine Environment; and</li> <li>deterioration of local habitats and other negative effects on species.</li> </ul>	<p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Aqueous Discharges specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>a detailed ESIA process will be completed to help identify impacts and define methods for their control and mitigation (where necessary);</li> <li>an assurance process undertaken by the applicant(s) / undertakers will check for compliance with MARPOL (International Convention for the Prevention of Pollution by Ships 1973 / 1978);</li> <li>whilst drilling, monitoring for any discharges will be an ongoing activity and Incident Management Guidelines (IMG) / Oil Spill Guidelines will be adhered;</li> <li>routine best-practice on board vessels will be employed, including but not limited to the use of Bunding, drip trays and spill kits to minimise leakage into the marine environment; and</li> </ul>

Topic	Potential impacts that could act in combination with onshore works (the Proposed Development)	Potential mitigation measures to be considered for offshore scheme
Waste	<ul style="list-style-type: none"> <li>disturbance to historical contaminant contained with seabed sediments;</li> <li>generation of non-hazardous and hazardous waste products; and</li> <li>pollution and contamination.</li> </ul>	<ul style="list-style-type: none"> <li>an Emergency Response Plan will be developed and agreed (anticipated to take place during the Marine Consenting process).</li> </ul> <p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Waste specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>a detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures (where necessary);</li> <li>waste generated through drilling, such as drill cuttings, will be managed in accordance with drilling waste management best-practice. Specifically, skip and ship to shore for treatment and disposal. During drilling operations the mud weight in the wellbores will be continuously monitored and optimized to prevent loss of major containment. Liquid wastes (including waste drilling mud) will be removed by barge (or similar process) and be treated or disposed of at a suitably permitted facility;</li> <li>it is anticipated that any waste(s) generated during the offshore will be consolidated and transported onshore for appropriate and licenced treatment and disposal; and</li> <li>the guiding principles of the waste management hierarchy will be used to inform the offshore scheme (i.e. the most preferred outcome will be prevention with disposal being the least preferred).</li> </ul>
Wildlife Disturbance	<ul style="list-style-type: none"> <li>noise disturbance to receptors from vessel movements, piling and drilling;</li> <li>temporary and / or permanent loss of habitat;</li> <li>introduction of invasive and non-native species;</li> <li>increases in Suspended Sediment Concentrations and associated deterioration of localised water quality;</li> </ul>	<p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Wildlife Disturbance specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>a detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures (where necessary);</li> <li>the Environmental &amp; Social Impact Assessment (ESIA) process will include a formal public consultation process; this will allow interested parties / technical consultees to provide feedback to the applicant(s) / undertakers;</li> </ul>

Topic	Potential impacts that could act in combination with onshore works (the Proposed Development)	Potential mitigation measures to be considered for offshore scheme
	<ul style="list-style-type: none"> <li>disturbance of historical contaminant and subsequent pollution risk;</li> <li>pollution of the marine environment during construction through accidental releases of fuels, oils, chemicals and other substances; and</li> <li>displacement of species.</li> </ul>	<ul style="list-style-type: none"> <li>the applicant(s) / undertaker will avoid sensitive habitats wherever possible, as informed by the Environmental Baseline Survey ('EBS') process;</li> <li>it is anticipated that through the Marine Consenting process, conditions / requirements for the applicant(s) / undertaker will be set by the relevant regulator bodies (i.e. OGA / MMO, as relevant). Compliance with these controls will help minimise disturbance to levels which are as low as reasonably practicable;</li> <li>route selection (and detailed refinement) for the Offshore Scheme to avoid sensitivities where possible;</li> <li>pre work conditions will ensure that potential risks arising from the disturbance of contaminant are minimised to a level as low as reasonably practicable (for example, seabed samples may be required ahead of construction commencement);</li> <li>the applicant(s) / undertaker will complete a Habitat Regulations Assessment ('HRA') for the offshore scheme; this will help identify the need for activity-specific mitigation and the need for any regulatory controls;</li> <li>the applicant(s) will complete MCZ assessments, as required, based on the potential for effects on MCZs adjacent to the offshore scheme. For the Teesside pipeline to the Endurance Store, it is anticipated that given to the distances between the pipeline and the closest MCZ (Runswick Bay), it would be possible to screen out detailed assessment at Stage 1;</li> <li>best-practice methodologies and construction practice will be employed, including for noise generating activities. This will include implementation of Joint Nature Conservation Committee (JNCC) best-practice and guidance; and</li> <li>it is anticipated that a Marine Mammal Mitigation Plan (MMMP) will be required and secured via the relevant regulatory process. If required, Natural England and JNCC will be involved in the formulation of activity-specific mitigation and seasonal constraints, as required.</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>accidental release of fuels, chemicals, and other contaminants leading to pollution of the Marine Environment;</li> <li>pollution and contamination;</li> <li>increases in SSC and associated deterioration of localised water quality; and</li> </ul>	<p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Water Quality specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>a detailed ESIA process will be completed to identify impacts and determine appropriate control and mitigation (where necessary);</li> </ul>

Topic	Potential impacts that could act in-combination with onshore works (the Proposed Development)	Potential mitigation measures to be considered for offshore scheme
	<ul style="list-style-type: none"> <li>disturbance of historical contaminant and subsequent pollution risk.</li> </ul>	<ul style="list-style-type: none"> <li>an assurance process undertaken by the applicant(s) / undertakers will check for compliance with MARPOL (International Convention for the Prevention of Pollution by Ships 1973 / 1978);</li> <li>whilst drilling, logging will be completed for aqueous discharges and IMG / Oil Spill Guidelines will be adhered to;</li> <li>an Emergency Response Plan will be developed and agreed (anticipated to take place during the Marine Consenting process);</li> <li>the applicant(s) / undertaker will ensure that avoidance of sensitive habitats wherever possible, as informed by the Environmental Baseline Survey (EBS) process;</li> <li>pre-work conditions will ensure that potential risks arising from the disturbance of contaminant are minimised to a level as low as reasonably practicable (for example, seabed samples may be required ahead of construction commencement); and</li> <li>best-practice for the discharge of ballast waters (i.e. outside of 12nm) will be employed.</li> </ul>
Fisheries	<ul style="list-style-type: none"> <li>detrimental impacts to fisheries resources;</li> <li>temporary restrictions to fishing grounds;</li> <li>displacement of mariners to neighbouring fisheries and associated pressure; and</li> <li>Navigational Risk.</li> </ul>	<p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Fisheries specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>a FLO will be adopted for the duration of construction (this is an appointed single point of contact to liaise between the Marine Licence / offshore permit applicant and local commercial fishers);</li> <li>North Sea best-practice regarding abandoned, lost and discarded fishing gear will be adhered to (i.e. marked fishing gear returned to shore for retrieval through existing MMO/local IFCA procedures);</li> <li>through mitigation detailed for topics such as Wildlife Disturbance and Water Quality above, potential impacts to fisheries resources will be managed effectively;</li> <li>application of Notices to Mariners / publication in Fishing News, as required;</li> <li>formal advertising to ensure awareness of works, as required;</li> <li>exclusion zones will be required at drill centres; they will be established to help ensure minimisation of risk to third parties, including fishers;</li> </ul>

Topic	Potential impacts that could act in-combination with onshore works (the Proposed Development)	Potential mitigation measures to be considered for offshore scheme
Marine Heritage / Archaeology	<ul style="list-style-type: none"> <li>• permanent and / or temporary loss of archaeological features.</li> </ul>	<ul style="list-style-type: none"> <li>• a detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures (where necessary); and</li> <li>• the applicant(s) / undertaker will ensure that avoidance of sensitive habitats wherever possible, as informed by the Environmental Baseline Survey (EBS) process.</li> </ul> <p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Marine Heritage / Archaeology specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>• a detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures (where necessary);</li> <li>• sensitive habitats will be avoided wherever possible, as informed by the Environmental Baseline Survey (EBS) process; and</li> <li>• completion of pre-works survey and recording requirements, as appropriate, to ensure documentation of heritage features.</li> </ul>
Shipping and Navigation / Other Sea Users	<ul style="list-style-type: none"> <li>• disturbance to other local marine users;</li> <li>• temporary restrictions to fishing grounds;</li> <li>• Navigational Risk; and</li> <li>• disruption to recreational traffic.</li> </ul>	<p>At this early stage in the offshore scheme, a list of potential mitigation measures has not yet been developed. A preliminary list of likely mitigation to be employed has been developed based on the available environmental information. For Shipping and Navigation / Other Sea Users specifically, key construction mitigation may include:</p> <ul style="list-style-type: none"> <li>• application of Notices to Mariners / publication in Fishing News, as required;</li> <li>• formal advertising to ensure awareness of works, as required;</li> <li>• the Environmental &amp; Social Impact Assessment (ESIA) will include a formal public consultation process; this will allow interested parties / technical consultees to provide feedback to the applicant(s) / undertakers;</li> <li>• exclusion zones will be required at drill centres;</li> <li>• a detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures (where necessary); and</li> <li>• the applicant(s) / undertaker will avoid key shipping features (i.e. shipping lanes, local fishing grounds, navigational assets / major shipping routes etc) wherever possible, as informed by the</li> </ul>

**Topic**

**Potential impacts that could act in-combination with onshore works (the Proposed Development)**

**Potential mitigation measures to be considered for offshore scheme**

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Environmental Baseline Survey (EBS) process. Where this is not possible, Navigational Risk will be assessed as informed by technical stakeholder discussions.

## 24.6 Identification and Assessment of Combined Effects

24.6.1 The interrelationships between the onshore and the offshore scheme considered here are those within and around Tees Bay. Specifically, this relates to the most seaward extent of the marine infrastructure associated with the onshore scheme (i.e. initial part of the CO<sub>2</sub> Export Pipeline and the replacement water discharge) and the landward elements of the offshore scheme (i.e. the connection of the onshore CO<sub>2</sub> Export Pipeline to the offshore CO<sub>2</sub> pipeline). For the offshore scheme, the area of overlap at and around the Tees Bay therefore relates to the continuation of the CO<sub>2</sub> Export Pipeline to the Endurance geological storage facility. The key potential environmental impacts associated with the onshore and offshore schemes in this area of overlap are summarised in Table 24C-6.

**Table 24C-6: Summary of Potential Impacts**

Topic	Potential Impacts
Coastal Water Quality	<ul style="list-style-type: none"> <li>Accidental release of fuels, chemicals, and other contaminants leading to pollution of the Marine Environment</li> <li>Increase in Suspended Sediment Concentrations and associated deterioration of localised water quality</li> <li>Disturbance of historical contamination and subsequent pollution risk</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>Pollution / Contamination</li> <li>Deterioration of localised air quality</li> </ul>
Aquatic Ecology	<ul style="list-style-type: none"> <li>Direct Loss and Physical Disturbance to Habitat and Species</li> <li>Changes in Underwater Soundscape</li> <li>Introduction of invasive and non-native species</li> </ul>
Marine Ecology	<ul style="list-style-type: none"> <li>Direct Loss and Physical Disturbance to Habitat and Species</li> <li>Physical Disturbance to Benthic Habitats and Species from Increased Suspended Sediment Concentrations (i.e. Turbidity) and Deposition</li> <li>Changes in Underwater Soundscape</li> <li>Introduction of invasive and non-native species</li> </ul>
Ornithology	<ul style="list-style-type: none"> <li>Noise Disturbance to Species</li> <li>Loss of supporting prey features</li> </ul>
Fisheries	<ul style="list-style-type: none"> <li>Temporary restrictions to fishing grounds</li> <li>Displacement of mariners to neighbouring fisheries and associated pressure</li> </ul>
Other Users of the Sea	<ul style="list-style-type: none"> <li>Disturbance to other local marine users</li> <li>Navigational Risk</li> <li>Disruption to recreational traffic</li> </ul>
Marine Heritage	<ul style="list-style-type: none"> <li>Permanent and / or temporary loss of archaeological features.</li> </ul>
Climate Change/ Green House Gas (GHG) Emissions	<ul style="list-style-type: none"> <li>Increases in GHG emissions</li> <li>Loss of carbon sink</li> </ul>

- 24.6.2 An assessment of the predicted significance of effects has been made after the application of embedded mitigation that has been designed into the onshore scheme and which is anticipated to be applied to the offshore scheme. A matrix summarising the basis for the assessment of combined effects is provided within Table 24C-7. This matrix has been used to screen the interactions between the potential sources of effects and relevant receptors, and to identify receptors which may be affected by both on-shore and offshore aspects of the Project (i.e. 'combined effects').
- 24.6.3 A review of the Zone of Influence identified for each topic within the ES for the onshore scheme has helped to inform an appraisal of the potential for combined effects. For further details on each individual Zone of Influence, please refer to the relevant Chapters of the ES (Volume I, Document Ref. 6.2).
- 24.6.4 For the offshore scheme, a Zone of Influence for the construction of the CO<sub>2</sub> Export Pipeline has not yet been established; for this reason, professional judgment and findings from assessments of comparable effects from the onshore scheme has been used to inform an appraisal of potential combined effects.
- 24.6.5 The majority of potential combined effects have been determined as likely to occur where the landward and seaward sections of the respective schemes meet and immediate surroundings, as summarised above. By way of example, marine mammals are unlikely to be affected by noise arising from the construction of the PCC Site; similarly, the construction of the injection wells offshore at the Endurance Store will not have an effect on onshore receptors by virtue of distance from the coast.
- 24.6.6 It is considered that any potential combined effects will be restricted to the construction phase and any (limited) recovery period thereafter. There are no foreseeable interactions between any operational activities related to the offshore and onshore schemes. On this basis, operational effects are solely considered in the respective ES for the onshore and offshore schemes.



**Table 24C- 7: Basis of Combined Effects Assessment**

Receptor	Onshore Scheme		Offshore Scheme		Summary of Considerations
	CO <sub>2</sub> Export Pipeline	Treated Water Outfall	Offshore CO <sub>2</sub> Pipeline	Offshore CO <sub>2</sub> Store <sup>2</sup>	
Coastal Water Quality	x	x	x	x	Construction of the onshore scheme is not predicted to result in any significant effects. In the event that the Replacement Outfall is required, this would be constructed via trenchless technologies (Horizontal Directional Drilling (HDD), or similar) with only very limited impact pathways for water quality, including when considered combined with the offshore scheme. Works that overlap within the onshore scheme and offshore scheme are beneath the Tees Bay seabed and will use trenchless technology, therefore there will be no impacts upon the Tees Bay. All other impacts will be remote from the shoreline and are outside of the study area.
Air Quality	x	x	x	x	Construction of the onshore scheme is not predicted to result in any significant effects during the construction phase which could reasonably overlap with minimal emissions associated with the construction of the offshore scheme. Operational emissions from vessels involved in construction activities from both the onshore and offshore schemes would be subject to appropriate emissions controls and vessel regulatory requirements and vessel numbers are not expected to exceed the relevant screening thresholds for assessment of air quality effects.
Aquatic Ecology	x	x	x	x	Works that overlap within the onshore scheme and offshore scheme are beneath the Tees Bay seabed and distant from the closest 'linked' Aquatic feature – the inner (freshwater) reaches of the River Tees.
Marine Ecology	✓	✓	✓	x	Activities associated with the construction of the onshore scheme and the construction of the offshore scheme have the potential to have a combined effect on marine ecology; this is considered further below.
Ornithology	✓	✓	✓	x	Activities associated with the construction of the onshore scheme and the construction of the offshore scheme have the potential to have a combined effect on ornithological features; this is considered below.
Fisheries	✓	✓	✓	x	Activities associated with the construction of the onshore scheme and the construction of the offshore scheme have the potential to have a combined effect on fisheries receptors.

<sup>2</sup> The Endurance Off-shore CO<sub>2</sub> Store component of the offshore scheme is located approximately 145km south west of the onshore scheme. On this basis, there is considered to be no pathway for effect when considered combined with the onshore scheme. It has been screened out for all receptors.

Receptor	Onshore Scheme		Offshore Scheme		Summary of Considerations
	CO <sub>2</sub> Export Pipeline	Treated Water Outfall	Offshore CO <sub>2</sub> Pipeline	Offshore CO <sub>2</sub> Store <sup>2</sup>	
Other Users of the Sea	✓	✓	✓	✗	Activities associated with the construction of the onshore scheme and the offshore scheme have the potential to have a combined effect on Socioeconomic receptors and other users of the sea. This is considered below.
Marine Heritage	✓	✓	✓	✗	Activities associated with the construction of the onshore scheme and the construction of the offshore scheme have the potential to have a combined effect on marine ecology. This is considered below.
Climate Change / GHG Emissions	✗	✗	✗	✗	Emissions from vessels involved in construction activities from both the onshore and offshore schemes would be subject to appropriate emissions controls and vessel regulatory requirements and vessel numbers are not expected to exceed the relevant screening thresholds for assessment of air quality effects. Aspects of GHG emissions will be managed through the Construction Environmental Management Plan (CEMP) that controls construction activities to minimise any impact on the environment through relevant regulations, industry good practice and specific measures described within this ES. The appointed contractor(s) will be required to develop and implement a CEMP to measure, monitor and report energy and water consumption and GHG emissions during construction. Similarly, for the offshore scheme, it is anticipated that a CEMP – or similar document – will be prepared and agreed during the consenting and environmental assessment process. Measures of specific relevance to the topic of Climate Change and GHG Emissions include the minimisation of fuel consumption on site in vehicles, equipment, and plant through minimisation of idling, and switching off when not being used. Preference will be given to lower carbon fuels such as HVO fuel, biodiesel, or electric powered plant instead of traditional fossil fuels. Regarding the topic of carbon sink, the loss of vegetated areas which can act as carbon sinks will be minimised across the footprint of the Natural Gas Connection Corridor, Electrical Connection Corridor and CO <sub>2</sub> Gathering Network. On this basis, no significant combined effects in terms of climate change and GHG emissions are anticipated. Above and beyond this, once operational, the NZT project as a whole will be a very significant negative emitter of CO <sub>2</sub> .

## Marine Ecology

- 24.6.7 A comprehensive assessment of potential impacts associated with Marine Ecology is provided within Chapter 14: Marine Ecology (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).

### Direct Loss and Physical Disturbance to Habitat and Species

- 24.6.8 The onshore and offshore schemes would result in the permanent and temporary loss of habitat across the intertidal and subtidal zones.
- 24.6.9 For the offshore scheme, habitat loss is anticipated to occur in association with the installation of the CO<sub>2</sub> Export Pipeline which in the nearshore, would occur in Tees Bay. However, the spatial extent this will represent is small, given that trenchless technologies (such as HDD) will be used to install the pipeline in the area of overlap within the Tees Bay. Loss of sandy habitat may occur under the footprint of the offshore scheme where the CO<sub>2</sub> Export Pipeline will be laid/buried on the sea floor.
- 24.6.10 For the onshore scheme, there will be localised permanent habitat loss in association with the installation of the replacement of the Treated Water Outfall (if required). The permanent loss as a result of the onshore Scheme is predicted to be small (as a worst-case, approximately 100m<sup>2</sup> has been assumed and representative of a different habitat type (in the subtidal zone).
- 24.6.11 As similar habitat types can be found across broader geographical scales, the area loss (both temporary and permanent) across both the onshore and offshore schemes of available habitat is considered to be negligible and the combined effect would be not significant.

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

- 24.6.12 Some limited dredging may be required for the onshore scheme within the vicinity of the Treated Water Outfall (existing or replacement options); this is associated with the emplacement of an outfall head, where required.
- 24.6.13 Construction activities (such as pipeline laying on the sea floor) associated with the offshore Scheme could temporarily increase SSC in the area. As the offshore pipeline installation and burial works from the offshore scheme are likely to occur sequentially rather than concurrently with the construction of the onshore scheme, there is therefore no potential for a combined effect to occur.
- 24.6.14 Preparatory dredging as part of the onshore scheme would cover a very small area of sea bed and volumes of dredged material would be low (by way of example, the volume provided within the draft DML (included in the draft DCO, Document Ref. 2.1) is up to ~5,000 m<sup>3</sup>). When considered against the context of a dynamic, high-energy environment, changes in SSC would be likely to be minimal. Therefore, when considered combined with the predicted extent of seabed disturbance predicted associated with the offshore scheme, the combined impact on marine ecology from increases in SSC is predicted to be negligible and the effect would be not significant.

### Changes in Underwater Soundscape

- 24.6.15 There is a potential pathway for the combined increase in underwater sound in the marine environment as a result of small scale piling activities (e.g. pin piling for diffuser head installation) and noise from vessels associated with construction works for the onshore and offshore schemes. Specifically, this relates to the construction works at the Existing or Replacement Outfall locations and the CO<sub>2</sub> Pipeline component of the offshore scheme. The construction of the CO<sub>2</sub> Export Pipeline for the onshore scheme is wholly under the seabed in the Tees Bay and is not considered further.
- 24.6.16 If these noise-generating activities were to occur concurrently, there may be a combined increase in underwater sound which could result in increased behavioural disturbance effects to some species. For example, the migration of marine mammals and fish and shellfish species in the Tees Estuary could be potentially impacted.
- 24.6.17 However, it is unlikely that these activities will occur simultaneously for a continuous period of time. Subsequently, there would be periods during which unimpeded movement of these receptors would be possible. Furthermore, both the drilling of pin piles and dredging as part of the onshore scheme, if they were to be required, would be undertaken in the Tees Bay. There is a distance of approximately 3 km between the potential working areas within the Tees Bay and the Tees Estuary; there is also a substantial barrier between the Tees Bay and the River Tees in the form of the South Gare breakwater. This means that these activities would not result in a temporary acoustic barrier which would impede migratory fish movements in the River Tees or adversely affect other receptors, such as marine mammals. Given the temporary, short-term and intermittent nature of behavioural disturbance effects as a result of underwater sound from the onshore scheme and offshore Schemes combined, the combined increase in noise is considered as negligible and the potential for cumulative effects is not significant.

### Ornithology

- 24.6.18 A comprehensive assessment of potential impacts associated with Ornithology is provided within Chapter 15: Ornithology (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).
- 24.6.19 Both the onshore and offshore schemes involve some construction activities within the Tees Bay which may have the potential to cause disturbance to ornithological receptors.
- 24.6.20 The location of the drilling/breakout point for the offshore scheme (approximately 2-3 km offshore) is within the extent of Teesmouth and Cleveland Coast SPA and is within the foraging range of both common and little terns. The presence of a pipeline laying vessel may therefore act as a localised barrier or deterrent to foraging seabirds.
- 24.6.21 A similar potential impact is explored and assessed in Chapter 15: Ornithology (ES Volume I), with regards to the installation of the Replacement Outfall for the onshore Scheme within the Tees Bay. The

conclusions drawn and the reasons for those conclusions are equally applicable here: the spatial extent of the area affected (estimated to be approximately 500 m<sup>2</sup>) represents an insignificant proportion of the wider Offshore area of the SPA. This impact will therefore in its own right be imperceptible in magnitude and not significant (neutral) and will therefore not contribute to a combined effect on any ornithological receptors.

## Fisheries

- 24.6.22 An assessment of potential impacts associated with Fisheries is provided within Chapter 14: Marine Ecology and Nature Conservation (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).
- 24.6.23 Both the onshore and offshore schemes involve some construction activities within the Tees Bay which may have the potential to cause a level of disturbance to commercial fishing grounds (including temporary loss of or restricted access to targeted areas).
- 24.6.24 However, it is considered that any combined impacts would only occur for commercial fishing types found in the Tees Bay, where there is a potential for restricted access as a result of the onshore scheme and offshore scheme together. Furthermore, engagement with the local Inshore Fisheries Conservation Authority (IFCA) and the MMO has indicated that there is a very limited extent of commercial fishing within this area with effort primarily focused on potting and trapping.
- 24.6.25 Based on the likely working areas for the onshore and offshore schemes, it is considered that displacement of vessels would be limited; this is discussed below in terms of 'Other Users of the Sea'. Notwithstanding, in order to help ensure full awareness of any works for the onshore scheme, the requirement for a FLO has been included within the draft DML. It is considered that this will help provide awareness of works and minimise any residual risk of disturbance.
- 24.6.26 Due to the short duration of the installation of the infrastructure, any restricted access to fishing grounds would be of a temporary, non-permanent nature for both the onshore and offshore schemes. Therefore, even if activities were to occur concurrently, the effect on fishing grounds would be negligible and as such the potential combined effect is considered to be not significant.

## Other Users of the Sea

- 24.6.27 A comprehensive assessment of potential impacts associated with Other Users of the Sea is provided within Chapter 20: Socio-economics (ES Volume I, Document Ref. 6.2) and Appendix 20B: Navigational Risk Assessment (ES Volume III, Document Ref. 6.4).
- 24.6.28 Based on the information available, it is currently anticipated that the construction of the CO<sub>2</sub> Export Pipeline for the offshore scheme will require use of vessels such as work boat(s) and/or barge(s). The HDD is expected to be drilled from approximately 3 km Offshore, where there is a minimum 5 m water depth, to onshore at the PCC Site – or alternatively from onshore to

offshore. In both cases there will be a need for work vessels to be located at the Offshore end of the HDD bores.

- 24.6.29 Vessel activity associated with construction of the onshore scheme will primarily take place within the inner reaches of the Tees Bay (i.e. around the locality of the existing or the replacement outfalls). The separation distance between the offshore scheme and the working areas for the onshore scheme are approximately 2.75 km and 1.25 km respectively (or 2.25 km and 750 m when likely potential exclusion zones of 500 m are applied). It is therefore considered that there is sufficient navigable room between both working areas and their associated exclusion zones.
- 24.6.30 In terms of vessel displacement, the marine working areas for the onshore scheme (i.e. the existing or replacement outfalls) are within the vicinity of some local third-party traffic such as that associated with the Teesside Wind Farm and localised potting and trapping effort. On this basis, there could be some short-term temporary displacement of other mariners through the presence of workboats and potential exclusion zones. Similarly, for the offshore scheme, there may be some temporary displacement of mariners through vessels and potential exclusion zones for this activity.
- 24.6.31 A typical exclusion zone for vessels such as those involved in both the construction of the onshore and offshore schemes (i.e. barges and jack-up rigs) is likely to be approximately 500 m. Simultaneous works at the Existing Outfall location and the potential working area for the offshore scheme have been considered in terms of combined effects; this has included application of a likely exclusion zone for each working area. In this scenario, there is approximately 2 km of navigable sea room between the onshore scheme and the offshore scheme. On this basis, it is considered that there is a very low risk of a potential combined (significant) effect on shipping and navigation arising from the simultaneous construction of the Proposed Development and the offshore scheme.
- 24.6.32 The exact location for the replacement outfall, if required, has not yet been confirmed. Following a precautionary approach, the most seaward extent of the Water Connection Corridor to the south east of the Proposed Development Site has been modelled. This is highly conservative, in terms of impacts on mariners. Simultaneous works at this indicative replacement outfall location and the potential working area for offshore scheme have been considered; this has included application of a likely exclusion zone for each working area. In this scenario, there is approximately 750 m of navigable sea room between the Proposed Development and the offshore scheme.
- 24.6.33 Considering the likely potential nature, size and capability of third-party mariners utilising this area and the separation distances discussed above, disturbance to both the onshore and offshore schemes of available habitat is considered to be negligible and the effect is considered to be not significant.

### Marine Heritage

- 24.6.34 A comprehensive assessment of potential impacts associated with Marine Heritage is provided within Chapter 19: Marine Heritage (ES Volume I,

Document Ref. 6.2), supporting Figures (Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4).

- 24.6.35 Based on a review of the area of overlap between the onshore and offshore schemes, for a combined effect to arise as a result of impacts to marine heritage assets, the onshore and offshore works would have to affect the same heritage asset.
- 24.6.36 There are no designated shipwrecks within the area of overlap between the onshore and offshore schemes. The closest designated asset is a protected shipwreck (List no. 1000077) located off Seaton Carew, 4.2 km west of the onshore scheme site boundary.
- 24.6.37 24 UKHO records on undesignated maritime shipwrecks/obstructions and 31 HER records on undesignated maritime assets were identified as part of the Marine Heritage baseline, as detailed within Chapter 19: Marine Heritage (ES Volume I, Document Ref. 6.2). These undesignated maritime assets are considered to be of low value (heritage significance) and the construction of the onshore scheme would have no impacts on these assets, resulting in a negligible effect. Specifically, the CO<sub>2</sub> Export Corridor would be under the Tees Bay seabed, beneath the two closest features (as detailed within Figure 19-1 (ES Volume II), Document Ref. 6.3). Considering the area of overlap between the onshore and offshore schemes, no additional combined effects have been identified.
- 24.6.38 There is one undesignated paleoenvironmental asset within the Study Area for the onshore scheme (Palaeochannel (HER 6396)) which is within the Water Discharge Corridor (Replacement Outfall). The construction of the launch site and HDD for the CO<sub>2</sub> Export Pipeline and Water Discharge Corridor (replacement outfall) may result in the loss of a small part of the asset, which is assessed to be of medium value. This would constitute a low impact, resulting in a minor adverse effect. Considering the modelled presence of this feature, the Palaeochannel broadly follows a north west trajectory from the CO<sub>2</sub> Export Corridor for the onshore scheme through the Teesside Wind Farm area (see Figure 19-1: (ES Volume II, Document Ref 6.3) for further details). The offshore scheme is located outside of this feature; on this basis, no additional combined effect has been identified.
- 24.6.39 Based on a review of the onshore scheme and the likely anticipated footprint of the offshore scheme (CO<sub>2</sub> Pipeline), it is predicted that this combined development would not result in any additional physical impacts to the marine heritage assets within the Tees Bay. Therefore, even if activities were to occur concurrently, the effect on marine heritage would be negligible and as such the potential combined effect is considered to be not significant.

## 24.7 Consideration of Onshore and Offshore Effects

### Context

24.7.1 This document recognises the high-level principles of EIA process and the need to consider the 'project as a whole'. Whilst the assessment of combined effects provided above focuses on the key area of overlap where there may be potential for combined (significant) effects to occur, an awareness of wider effects from both onshore and offshore schemes may be beneficial. This also responds to feedback provided through the formal consultation process in advance of the DCO Application, as detailed above.

### Onshore and Offshore Schemes

24.7.2 The onshore scheme, as described in Section 24.3, is being promoted by Net Zero Teesside Power Limited (NZN Power) and Net Zero North Sea Storage Limited (NZNS Storage). NZN Power and NZNS Storage (together the Applicants for the purposes of the DCO Application) have been incorporated on behalf of bp as operator of the two Partnerships.

24.7.3 The offshore scheme, as described in Section 24.3, will also be the responsibility of NZNS Storage, comprising the offshore section of the CO<sub>2</sub> Export Pipeline to a suitable offshore geological CO<sub>2</sub> storage site under the North Sea, CO<sub>2</sub> injection wells and associated infrastructure. These elements are not included in the Application and will be subject to separate consent applications.

24.7.4 More information on NZN Power and NZNS Storage and the project partners can be found in the Funding Statement (Document Ref. 3.3).

### Summary of Effects

24.7.5 Table 25C-8 and Table 24C-9 provide a summary of the wider effects associated with the onshore and offshore schemes.

24.7.6 For the onshore scheme, a comprehensive assessment of potential effects is provided in the ES Chapters (ES Volume I, Document Ref. 6.2), supporting Figures (ES Volume II, Document Ref. 6.3) and Appendices (ES Volume III, Document Ref. 6.4). On this basis, specific details of mitigation are not supplied however a summary of effects is included.

24.7.7 For the offshore scheme, activities associated with construction and operation have been considered together with the potential interactions with the surrounding environment. In the absence of a detailed Environmental Assessment, the summary of effects has been informed by a range of sources which are summarised below:

- preliminary outputs from an early-stage Environmental Identification (ENVID) process for the offshore scheme;
- a range of supporting relevant literature, scientific evidence and information surrounding designated sites within or adjacent to the offshore scheme (including those sources cited within this report);



- relevant environmental assessment and consenting data associated with the White Rose Carbon Capture and Storage Project and lessons-learned from National Grid (now a partner in NEP);
- publicly available information relating to the likely potential route options for the offshore scheme;
- strategic regional environmental data;
- site-specific constraints information for the Tees Bay and immediate surrounds;
- experience from comparable North Sea marine infrastructure development particularly related to the construction and operation of pipelines; and
- DECC Offshore Energy Strategic Environmental Assessment Reporting and underpinning studies.

24.7.8 NZT Power and NZNS Storage benefit from significant operating experience within the North Sea. As operator of the two partnerships, BP Exploration Operating Company Limited (BPEOC) is an operating subsidiary and separate legal entity within the bp Group of companies (bp). BPEOC is an integrated and well-established operator in the United Kingdom Continental Shelf (UKCS) where it has operated for over 30 years and holds numerous licence interests, some of which it operates on behalf of itself and its partners.

24.7.9 The consideration of potential effects arising from the offshore scheme has taken account of the potential for there to be cumulative effects with other projects, being those typically built within the relevant offshore area (such as pipeline and cable installation projects) and any schemes specifically known to be progressing in the area. As is usual it is assumed that any other projects will employ (and be required by the relevant regulatory consents to employ) typical good practice techniques to avoid and reduce any potential environmental effects.

24.7.10 It will be for the Environmental Assessment of the offshore scheme to consider in-full potential cumulative and combined effects, as informed by the information available at that time and the outputs from formal consultation and technical engagement.

**Table 24C- 8: Summary of Effects (Onshore Scheme)**

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
Air Quality	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• construction activities and associated production of / disturbance of dust;</li> <li>• emissions from construction vehicles and mobile construction plant; and</li> <li>• emissions from construction phase road traffic.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• process emissions from the operational Proposed Development (stack emissions, including N-amines in respect of human health); and</li> <li>• emissions from operational road traffic (using traffic data in the form of traffic flows, composition and speed).</li> </ul>	Local residents and ecological receptors, including designated sites	<p>The potential effects associated with this topic are assessed in full within Chapter 8: Air Quality (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>• changes to / reduction in local air quality;</li> <li>• deposition of air pollutants, such as nitrogen, on sensitive receptors; and</li> <li>• visible plume from the Proposed Development.</li> </ul>	<p><b>No significant effects</b> are predicted for Air Quality during the construction or operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 8: Air Quality (ES Volume I, Document Ref. 6.2).</p>
Surface Water, Flood Risk and Water Resources	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• crossings of / working near watercourses and surface waterbodies during construction of the Proposed Development;</li> <li>• construction within the Water Discharge Corridor and CO<sub>2</sub> Export Corridor; and</li> <li>• increases in volumes of impermeable surfaces;</li> </ul>	Waterbodies within the vicinity of the Proposed Development and waterbodies which are in hydraulic connectivity with the area surrounding the Proposed Development	<p>The potential effects associated with this topic are assessed in full within Chapter 9: Surface Water, Flood Risk and Water Resources (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>• temporary impacts on surface water quality such as those associated with pollution and changes in SSC;</li> </ul>	<p><b>No significant effects</b> are predicted for surface water, water resources and flood risk during the construction or operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 9: Surface Water, Flood Risk and Water Resources (ES</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<ul style="list-style-type: none"> <li>changes to / increases in surface water run-off during construction of the Proposed Development.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>release of treated effluent, including thermal discharges arising from operational cooling;</li> <li>atmospheric emissions;</li> <li>increases in volumes of impermeable surfaces arising from the presence of the Proposed Development; and</li> <li>changes to / increases in water demand arising from workforce.</li> </ul>		<ul style="list-style-type: none"> <li>temporary impacts on morphology of the Tees and other waterbodies;</li> <li>increase in surface water and groundwater flood risk as a result of increased surface water and below ground installations; and</li> <li>changes to / increases in potable water demand.</li> </ul>	Volume I, Document Ref. 6.2) and ES Appendix 9A: Flood Risk Assessment (ES Volume III, Document Ref. 6.4).
Geology and Hydrogeology	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>mobilisation of contaminants during remediation and construction;</li> <li>changes to hydrogeological regimes (e.g. during dewatering activities); and</li> <li>interactivity with surface water and land quantity and quality through construction of the Proposed Development.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>permanent soil loss where permanent infrastructure is installed; and</li> </ul>	Geological and hydrogeological features of the area within (and in connectivity with) the Proposed Development; human and ecological receptors.	<p>The potential effects associated with this topic are assessed in full within Chapter 10: Geology, Hydrogeology and Contaminated Land (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>mobilisation of contaminants during remediation and construction;</li> <li>changes to hydrogeological regimes (e.g. during dewatering activities);</li> <li>changes to surface water quantity and quality; and</li> <li>depletion of / detrimental impacts to soil resources.</li> </ul>	<p><b>No significant effects</b> are predicted with regards to geology, hydrogeology and contaminated land during the construction or operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 10: Geology and Hydrogeology (ES Volume I, Document Ref. 6.2).</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<ul style="list-style-type: none"> <li>impacts to soil quality (and abundance), groundwater and watercourses, which could potentially occur during operation as a result of accidental spills from the handling or leakage of fuels.</li> </ul>			
Noise and Vibration	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>changes in noise and vibration levels during site clearance, remediation, construction and piling works; and</li> <li>predicted changes in road traffic noise levels on the local road network during the construction phase.</li> </ul> <p><b>Operation:</b> The assessment has concluded that no significant operational significant adverse noise effects are predicted to occur at residential, industrial or ecological receptors during operations.</p>	Potential noise sensitive receptors (residential and industrial) as well as ecological, including ornithological features of surrounding designated sites.	<p>The potential effects associated with this topic are assessed in full within Chapter 11: Noise and Vibration (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>noise and vibration levels during site clearance, remediation, construction works;</li> <li>predicted changes in road traffic noise levels on the local road network during the construction phase;</li> <li>disturbance to residential receptors; and</li> <li>disturbance to ecological receptors.</li> </ul>	<p><b>No significant effects</b> on residential, industrial, or ecological receptors are predicted with regards to noise and vibration during the construction or operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 11: Noise and Vibration (ES Volume I, Document Ref. 6.2).</p>
Terrestrial Ecology and Nature Conservation	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>permanent losses of semi-improved grassland habitat for the construction of the PCC Site;</li> <li>temporary losses of additional areas of semi-improved grassland and scrub for temporary construction laydown</li> </ul>	Terrestrial ecology (habitats and species)	<p>The potential effects associated with this topic are assessed in full within Chapter 12: Terrestrial Ecology and Nature Conservation (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>temporary and/or permanent loss of habitat;</li> </ul>	<p><b>No significant effects</b> are predicted on terrestrial species as a consequence of construction activities, based on the absence of protected species identified within and near to the Proposed Development Site. However appropriate pre-construction surveys will be undertaken prior to works</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<p>and/or construction corridors; and</p> <ul style="list-style-type: none"> <li>disturbance of Open Mosaic Habitats (OMH) habitats for construction of the Natural Gas Connection.</li> </ul> <p>No significant effects are predicted on terrestrial species as a consequence of construction activities, based on the absence of protected species identified within and near to the Proposed Development Site. However appropriate pre-construction surveys will be undertaken prior to works commencing to confirm that no protected species are present in working areas.</p> <p><b>Operation:</b> The main potential source of operational effects is from emissions to air from the operation of the Proposed Development. Operational noise effects on terrestrial ecological receptors will not be significant.</p>		<ul style="list-style-type: none"> <li>disturbance to and/or displacement of ecological receptors and sensitive species adjacent to / within the onshore scheme site;</li> <li>contamination of habitat / deterioration of habitat;</li> <li>introduction of invasive and non-native species;</li> <li>pollution of aquatic features and/or supporting habitats;</li> <li>disturbance to receptors; and</li> <li>temporary impacts on water quality such as those associated with pollution and changes in SSC.</li> </ul>	<p>commencing to confirm that no protected species are present in working areas.</p> <p>For further details including related to any required mitigation, please refer to Chapter 12: Terrestrial Ecology and Nature Conservation (ES Volume I, Document Ref. 6.2).</p>
Aquatic Ecology	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>impacts on undesignated habitats (watercourses and ponds) e.g. on water quality as</li> </ul>	Aquatic habitats and species	The potential effects associated with this topic are assessed in full within Chapter 13: Aquatic Ecology (ES Volume I, Document Ref. 6.2). Key potential effects are:	<b>No significant effects</b> were identified on aquatic habitat, species and communities during the construction or operational phases of the Proposed Development.

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<p>a result of construction activities;</p> <ul style="list-style-type: none"> <li>impacts on fish and their habitats e.g. through unavoidable release of sediments to water bodies; and</li> <li>impacts on macroinvertebrates and macrophytes e.g. through reduced habitat quality which may result in the changes to the composition of the community.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>impacts from atmospheric deposition of nitrogen on ponds with the potential to result in nutrient enrichment;</li> <li>impacts from discharge from treated wastewater on waterbodies; and</li> <li>indirect impacts on fish, macroinvertebrates and macrophytes on their habitats and water quality.</li> </ul>		<ul style="list-style-type: none"> <li>direct loss and physical disturbance to habitat and species;</li> <li>physical disturbance to benthic habitats and species from increased SSC (i.e. turbidity) and deposition;</li> <li>indirect effects to marine ecology from changes in marine water quality (excluding turbidity);</li> <li>changes in underwater soundscape;</li> <li>changes in airborne soundscape; and</li> <li>pollution of the marine environment during construction through accidental releases of fuels, oils, chemicals and other substances.</li> </ul>	<p>For further details including related to any required mitigation, please refer to Chapter 13: Aquatic Ecology (ES Volume I, Document Ref. 6.2).</p>
Marine Ecology	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>direct loss and physical disturbance to habitat and species (including intertidal and subtidal benthic ecology, fish and shellfish and marine mammals) under the footprint of the marine construction works</li> </ul>	Marine habitats and species	<p>The potential effects associated with this topic are assessed in full within Chapter 14: Marine Ecology (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>temporary and/or permanent loss of habitat;</li> <li>disturbance to ecological receptors and sensitive species;;</li> </ul>	<p><b>No significant effects</b> on marine ecology are anticipated as a consequence of construction or operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<p>associated with the Water Connections through:</p> <ul style="list-style-type: none"> <li>– installation of rock armouring / scour protection around the outfall head if required;</li> <li>– creation of breakout points within the foreshore for the CO<sub>2</sub> Export Pipeline and (if required) replacement outfall installed using trenchless technologies; and</li> <li>– anchoring, grounding or positioning of work boat(s) and /or barge(s) on the seabed.</li> </ul> <ul style="list-style-type: none"> <li>• physical disturbance to benthic habitats and species from increased suspended sediment concentrations (i.e. turbidity) and deposition;</li> <li>• indirect effects to marine ecology from changes in marine water quality (excluding turbidity);</li> <li>• changes in underwater soundscape; and</li> <li>• changes in airborne soundscape.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• thermal effects from treated cooling water discharge;</li> </ul>		<ul style="list-style-type: none"> <li>• contamination of habitat / deterioration of habitat; and</li> <li>• displacement of species.</li> </ul>	<p>to Chapter 14: Marine Ecology (ES Volume I, Document Ref. 6.2).</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<ul style="list-style-type: none"> <li>chemical effects from any treated wastewater discharge; and</li> <li>effects to intertidal habitats and species (including fish) from the deposition of airborne pollutants.</li> </ul>			
Ornithology	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>temporary degradation or losses of habitat;</li> <li>disturbance of birds, principally from noise associated with plant equipment, piling and construction;</li> <li>impacts from emissions such as dust, particulate matter, from heavy construction plant and construction traffic;</li> <li>increases in surface water run-off and flood risk;</li> <li>changes in water quality from run-off to surface waters affecting wetland habitats used by birds and distribution/quality of foraging resources;</li> <li>permanent losses of habitat used by nesting, roosting and feeding birds where new infrastructure is installed;</li> <li>permanent losses of and physical impacts on subtidal habitats; and</li> </ul>	Ornithological features (species and habitats) and designated sites	<p>The potential effects associated with this topic are assessed in full within Chapter 15: Ornithology (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>temporary and/or permanent loss of habitat;</li> <li>disturbance to ecological receptors and sensitive species;</li> <li>contamination of habitat / deterioration of habitat; and</li> <li>displacement of species.</li> </ul>	<p><b>No significant effects</b> on ornithology are anticipated as a consequence of construction or operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 15: Ornithology (ES Volume I, Document Ref. 6.2).</p>



Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<ul style="list-style-type: none"> <li>disturbance of marine birds arising from the presence of work boats and/or barges and the presence of construction workers in the offshore environment.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>disturbance of birds, principally from noise (PCC Site and CO<sub>2</sub> Gathering Network)</li> <li>increases in surface water run-off and flood risk;</li> <li>emissions from operational vehicular traffic;</li> <li>point source emissions of NO<sub>x</sub>, acid and nutrient nitrogen;</li> <li>impacts (thermal and chemical) on marine and benthic organisms arising from treated water discharge, resulting in reductions of available foraging resources for some fish-eating birds; and</li> <li>impacts of tall structures as a barrier to movement of birds for which Teesmouth and Cleveland Coast Ramsar, SPA and SSSI are designated.</li> </ul>			
Traffic and Transportation	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>temporary increases of traffic flows, including HGVs.</li> </ul>	Local residential and industrial population	The potential effects associated with this topic are assessed in full within Chapter 16: Traffic and Transport (ES	<b>No significant effects</b> on traffic and transport are anticipated as a consequence of construction or

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>increases in traffic associated with operational staff movements; and</li> <li>HGV traffic generated by deliveries of operational and maintenance plant.</li> </ul>		<p>Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>increased traffic flows on local road network.</li> </ul>	<p>operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 16: Traffic and Transport (ES Volume I, Document Ref. 6.2) and ES Appendix 16A: Transport Assessment (ES Volume III, Document Ref. 6.4)</p>
Landscape and Visual Amenity	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>plant equipment and activity associated with the construction of the Proposed Development; and</li> <li>lighting and supporting construction activity.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>presence of the Proposed Development, including stack</li> <li>lighting; and</li> <li>Plume arising from the stack within the Proposed Development.</li> </ul>	Local residential and industrial population; recreational users	<p>The potential effects associated with this topic are assessed in full within Chapter 17: Landscape and Visual Amenity (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>deterioration to neighbouring visual receptors;</li> <li>temporary and / or permanent changes to the landscape; and</li> <li>disturbance to neighbouring visual receptors through construction activities and lighting.</li> </ul>	<p><b>No significant effects</b> on residential receptors are anticipated as a consequence of construction and operation (including maintenance) of the Proposed Development.</p> <p><b>Moderate adverse (significant) effects</b> are expected to occur at a small number of recreational receptors; South Gare Breakwater (Viewpoint 5), England Coastal Path (Viewpoint 7) and Redcar seafront (Viewpoint 8). These are likely to experience short-term moderate adverse (significant) effects during construction as a result of the close distance to the PCC Site and limited intervening vegetation.</p> <p>In terms of operation, there are expected to be <b>moderate adverse (significant) effects</b> at Viewpoint 7: England Coast Path as a result of the path's close proximity to the PCC Site.</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
				<p>It is not possible to eliminate the visual impacts associated with the development PCC Site due to its scale. Mitigation is therefore not possible to reduce the visual intrusion of the buildings in the landscape and minimise impact on visual amenity. However, as far as reasonably practicable, the design of the Proposed Development will seek to minimise adverse impacts on visual amenity through appropriate siting of infrastructure and through the selected building materials and colours, as set out in the Design and Access Statement (Document Ref. 5.4) that accompanies the DCO application.</p> <p>For further details including related to any required mitigation, please refer to Chapter 17: Landscape and Visual Amenity (ES Volume I, Document Ref. 6.2).</p>
<p>Archaeology and Cultural Heritage</p>	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• disturbance to known features of archaeological interest;</li> <li>• disturbance to unknown archaeological features; and</li> <li>• changes to setting and permanent loss of heritage value during construction.</li> </ul>	<p>Cultural heritage and local residential / recreational population</p>	<p>The potential effects associated with this topic are assessed in full within Chapter 18: Cultural Heritage (ES Volume I, Document Ref. 6.2). Key potential effects are:</p> <ul style="list-style-type: none"> <li>• temporary and permanent effects to heritage assets as a result of changes to their setting and</li> </ul>	<p><b>No significant effects</b> on cultural heritage are anticipated as a consequence of construction and operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>		permanent loss of heritage value as a result of construction related activities.	to Chapter 18: Archaeology and Cultural Heritage (ES Volume I, Document Ref. 6.2).
Marine Heritage	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>disturbance to known features of archaeological interest;</li> <li>disturbance to unknown archaeological features; and</li> <li>changes to setting and permanent loss of heritage value as a result of construction disturbance</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>	Cultural heritage and local residential / recreational population	The potential effects associated with this topic are assessed in full within Chapter 19: Marine Heritage (ES Volume I, Document Ref. 6.2). No significant effects are predicted to occur during construction or operation of the Proposed Development on any designated or undesignated paleoenvironmental assets or any designated maritime assets as the CO <sub>2</sub> Export Pipeline and replacement Water Discharge corridors have been located to avoid known marine heritage assets.	<p><b>No significant effects</b> on cultural heritage are anticipated as a consequence of construction and operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 19: Marine Heritage (ES Volume I, Document Ref. 6.2).</p>
Socioeconomics and Tourism	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>construction of the Proposed Development resulting in increased potential employment;</li> <li>disturbance to local residential and industrial population through construction activities; and</li> <li>interference to commercial and recreational (marine) traffic.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>operational demand for workforce.</li> </ul>	Local residential and industrial population, tourism, local workforce and wider (regional) workforce	<p>The potential effects associated with this topic are assessed in full within Chapter 20: Socioeconomics (ES Volume I, Document Ref. 6.2). Key potential effects include:</p> <ul style="list-style-type: none"> <li>construction employment created by the Proposed Development is predicted to have a major beneficial (significant) short-term effect in the local area;</li> <li>minor disruption on the local community, businesses, tourism and wider amenities is expected during construction; and</li> <li>use of some public rights of way may be temporarily disrupted during construction which will require either</li> </ul>	<p><b>Significant (beneficial) effects</b> on socioeconomics and tourism are anticipated as a consequence of construction and operation (including maintenance) of the Proposed Development.</p> <p>For further details including related to any required mitigation, please refer to Chapter 20: Socioeconomics (ES Volume I, Document Ref. 6.2).</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
			controlled access or, as a last resort, temporary diversions.	

**Table 24C- 9: Summary of Effects (Offshore Scheme)**

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
Air Quality	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>emissions from construction equipment and vessels.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>pipeline inspection plans will be prepared and if required, intelligent “pigging” operations will be considered.</li> </ul>	Local residents and ecological receptors, including designated sites	<p>A preliminary appraisal of Air Quality has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>reduction in local or regional air quality and associated detrimental impacts on ecological receptors; and</li> <li>ecological damage and/or disturbance.</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>A detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures. Emissions predominantly offshore during the construction of the offshore scheme will be short term and minor (a limited range of vessels are required for the pipeline installation and installation of wells). Notwithstanding, the offshore scheme vessel fleet emissions and their duration in the field will be optimised. All vessels involved in the offshore scheme will be subjected to a formal marine assurance process and rig mobilisation audits will be completed, as required. Diesel consumption for offshore vessels will be subject to tracking and reporting and rig power management system(s) will be employed to minimise atmospheric discharges. For periodic operational discharges, a conditional monitoring and design philosophy will be</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
				<p>developed to minimise the number and frequency of releases; this will be considered fully through the ESIA and consenting process.</p> <p>Based on the available information and the likely application of mitigation including the measures detailed above, the outputs from baseline survey activities to-date and professional judgment, <b>no significant effects</b> are anticipated as a result of the construction and operation of the offshore scheme.</p>
Water Quality	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• construction of the offshore CO<sub>2</sub> Export Pipeline;</li> <li>• dewatering activities;</li> <li>• accidental releases including from vessels during construction;</li> <li>• release of commissioning fluids (including chemicals) during commissioning and hydrostatic testing;</li> <li>• release of hydraulic oil product during valve testing; and</li> <li>• disturbance of buried contaminant along the route during installation of the offshore CO<sub>2</sub> Export Pipeline.</li> </ul> <p><b>Operation:</b></p>	Waterbodies within the vicinity of the Tees Bay, marine water quality across the offshore scheme and ecological receptors	<p>A preliminary appraisal of Water Quality has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>• temporary (localised) changes to coastal geomorphology due to construction activities;</li> <li>• contamination of the marine environment through the disturbance of buried contaminant;</li> <li>• increases in SSC during construction, and associated deposition effects and smothering of habitats;</li> <li>• localised reductions in water quality;</li> <li>• localised impact on benthic habitat and water quality; and</li> <li>• permanent (localised) changes to offshore marine</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>A detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures. Chemicals and materials used in the construction process will be strictly controlled, in line with existing north sea operational practice. For limited construction-phase releases, such as bentonite and/or barite (materials typically used during drilling operations), substances will be selected from PLONAR lists, where feasible (both bentonite and barite are PLONAR). It is expected that pre-construction physical and chemical sampling and analysis will be agreed with the relevant regulatory bodies (i.e. OGA and the MMO) and</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<ul style="list-style-type: none"> <li>potential displacement of naturally occurring outcrop formation waters and release at sea floor.</li> </ul>		<p>geomorphology at the seabed due to the presence of injection wells.</p>	<p>undertaken. In terms of vessel activities, an assurance process undertaken by the applicant(s) will check for compliance with MARPOL (International Convention for the Prevention of Pollution by Ships 1973 / 1978). Routine best-practice on board vessels will be employed, including but not limited to the use of Bunding, drip trays and spill kits to minimise leakage into the marine environment. Whilst drilling, logging will be completed for aqueous discharges and IMG / Oil Spill Guidelines will be adhered to. Furthermore, for unplanned events, an Emergency Response Plan will be developed and agreed (anticipated to take place during the Marine Consenting process). In terms of operational effects, these are anticipated to solely relate to displacement of naturally occurring formation waters and release on the sea floor; this is considered to be of minor significance but will be further assessed in the ESIA, with appropriate mitigation and monitoring programme to be defined.</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>no significant effects</b> are anticipated as a result of the construction and operation of the offshore scheme.</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
Noise and Vibration	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• clearance of UXO along the offshore CO<sub>2</sub> pipeline route;</li> <li>• dredging, trenching and other activities associated with the installation of the offshore CO<sub>2</sub> pipeline route; and</li> <li>• vessel noise.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• pipeline inspection plans will be prepared and if required, intelligent “pigging” operations will be considered. Pigging and other periodic pipeline maintenance activities capable of generating noise &amp; vibration; and</li> <li>• routine operational vessels and/or aviation traffic.</li> </ul>	<p>Ecological receptors, including designated sites.</p>	<p>A preliminary appraisal of Noise &amp; Vibration has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>• species disturbance, injury and potential mortality;</li> <li>• noise disturbance to receptors from vessel movements, piling and drilling;</li> <li>• displacement of species; and</li> <li>• other behavioural effects arising from noise disturbance.</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>A detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures. Where possible, the outputs from environmental baseline surveys will be used to avoid sensitive receptors; similarly, UXO disposal will be avoided – where safe and practical to do so – via refinement of route alignment. The ESIA process will include a formal public consultation process which will allow interested parties and technical consultees the opportunity to provide feedback on proposals. It is anticipated that through the Marine Consenting process, conditions / requirements for the applicant(s) will be set by the relevant regulator bodies (i.e. OGA / MMO, as relevant). Compliance with these controls will help minimise disturbance to levels which are as low as reasonably practicable. The applicant(s) / undertaker will complete a Habitat Regulations Assessment (‘HRA’) for the Offshore Scheme offshore scheme; this will help identify the need for activity-specific mitigation and the need for any regulatory controls. The applicant(s) will complete MCZ assessments, as required, based on the presence for realistic effects on MCZs adjacent to the</p>



Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
				<p>offshore scheme. For the Teesside pipeline to the Endurance Store, it is anticipated that due to the distances between the pipeline and the closest MCZ (Runswick Bay), it would be possible to screen out detailed assessment at Stage 1. Best-practice methodologies and construction practice will be employed, including for noise generating activities. This will include implementation of Joint Nature Conservation Committee (JNCC) best-practice and guidance. Linked with this, it is anticipated that a Marine Mammal Mitigation Plan (MMMP) will be required and secured via the relevant regulatory process. If required, Natural England and JNCC will be involved in the formulation of activity-specific mitigation and seasonal constraints, as required.</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>moderate adverse (significant) effects</b> are anticipated as a result of the completion of UXO clearance, where required; the rationale for this is provided below in relation to specific marine ecology receptors. For all other construction and operational activity, with the application of best-practice and</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
				mitigation, <b>no significant effects</b> are predicted.
Marine Ecology	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• construction of the offshore CO<sub>2</sub> Export Pipeline;</li> <li>• dewatering activities;</li> <li>• accidental releases and other construction-phase releases as described above under Water Quality;</li> <li>• disturbance of buried contaminant;</li> <li>• UXO clearance; and</li> <li>• vessel noise.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• displacement of chemically inhibited water;</li> <li>• routine operational vessels and/or aviation traffic; and</li> <li>• permitted released of effluent during injection of dense-phase CO<sub>2</sub> into the geological store.</li> </ul>	Marine habitats and species, including designated sites; fisheries.	<p>A preliminary appraisal of Marine Ecology has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>• introduction of invasive and non-native species;</li> <li>• temporary and/or permanent loss of habitat arising from the construction of the offshore CO<sub>2</sub> Export Pipeline;</li> <li>• disturbance to ecological receptors and sensitive species arising from construction noise and UXO clearance;</li> <li>• contamination of habitat / deterioration of habitat arising;</li> <li>• physical disturbance to benthic habitats and species from increased suspended sediment concentrations (i.e. turbidity) and deposition;</li> <li>• indirect effects to marine ecology from changes in marine water quality (excluding turbidity); and</li> <li>• depletion / changes to abundance of prey species.</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>It is anticipated that the mitigation detailed above for Air Quality, Water Quality and Noise and Vibration would be of primary relevance to Marine Ecology; for brevity, it is not repeated here.</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>moderate adverse (significant) effects</b> are anticipated as a result of the completion of UXO clearance, where required. Specifically, this is related to the potential impacts associated with UXO clearance on species with high sensitivity to changes in the underwater soundscape, including the harbour porpoise (<i>Phocoena phocoena</i>), the designated feature of the Southern North Sea SAC. For all other construction and operational activity, with the application of best-practice and mitigation, <b>no significant effects</b> are predicted.</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
Ornithology	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• construction of the offshore CO<sub>2</sub> Export Pipeline;</li> <li>• UXO clearance; and</li> <li>• vessel noise.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• pipeline inspection plans will be prepared and if required, intelligent “pigging” operations will be considered. Pigging and other periodic pipeline maintenance activities capable of generating noise &amp; vibration; and</li> <li>• routine operational vessels and/or aviation traffic.</li> </ul>	Ornithological features (species and habitats) and designated sites.	<p>A preliminary appraisal of Marine Ecology has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>• disturbance to ecological receptors and sensitive species arising from construction activities;</li> <li>• contamination of habitat / deterioration of habitat; and</li> <li>• displacement of species through construction and operational activities.</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>It is anticipated that the mitigation detailed above for Air Quality, Water Quality and Noise and Vibration would be of primary relevance to Ornithology; for brevity, it is not repeated here. Notably, there are only limited sections of the offshore scheme which are within the proximity of marine areas considered of particular importance for seabirds.</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>no significant effects</b> are anticipated as a result of the construction and operation of the offshore scheme.</p>
Fisheries	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• construction of the offshore CO<sub>2</sub> Export Pipeline;</li> <li>• UXO clearance;</li> <li>• vessel noise; and</li> <li>• presence of vessels within and adjacent to fishing grounds.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• permanent exclusion zones at wellhead / injection sites within the Endurance store area;</li> </ul>	Fisheries stocks and commercial fishers / commercial fishing effort targeting grounds within the vicinity of the offshore scheme.	<p>A preliminary appraisal of Marine Ecology has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>• detrimental impacts to fisheries resources;</li> <li>• temporary restrictions to fishing grounds;</li> <li>• displacement of mariners to neighbouring fisheries and associated pressure; and</li> <li>• Navigational Risk.</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>It is anticipated that the mitigation detailed above for Air Quality, Water Quality and Noise and Vibration would be of primary relevance to Ornithology; for brevity, it is not repeated here. Additional fisheries-specific mitigation would be adopted. For example, a FLO will be adopted for the duration of construction (this is an appointed single point of contact to liaise between the Marine Licence / offshore permit applicant and local commercial fishers). In order to help</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<ul style="list-style-type: none"> <li>presence of manifolds, rock protection and other features on the seabed; and</li> <li>routine operational vessels and/or aviation traffic.</li> </ul>			<p>achieve complete awareness of construction works, Notices to Mariners will be secured and publication of works in Fishing News will be carried out, as required. Exclusion zones will be required at drill centres; they will be established to help ensure minimisation of risk to third parties, including fishers. Sensitive habitats will be avoided wherever possible, as informed by the Environmental Baseline Survey (EBS) process.</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>moderate adverse (significant) effects</b> are anticipated as a result of permanent exclusion zones at wellheads, and the associated restrictions to commercial fishing activity. For all other construction and operational activity, with the application of best-practice and mitigation, <b>no significant effects</b> are predicted.</p>
Waste	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>pre-construction route clearance activity;</li> <li>construction of the offshore CO<sub>2</sub> Export Pipeline;</li> <li>release of commissioning fluids (including chemicals) during</li> </ul>	Marine water quality, humans, ecological receptors (including designated sites).	<p>A preliminary appraisal of Waste has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>disturbance to historical contaminant contained with seabed sediments;</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>A detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures. Waste generated through drilling, such as drilling muds, will be</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<p>commissioning and hydrostatic testing;</p> <ul style="list-style-type: none"> <li>release of hydraulic oil product during valve testing;</li> <li>routine vessel wastes during construction; and</li> <li>UXO clearance.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>low-level operational discharges from supporting vessel activity (i.e. grey water, black water, non-hazardous waste etc).</li> </ul>		<ul style="list-style-type: none"> <li>generation of non-hazardous and hazardous waste products; and</li> <li>pollution and contamination.</li> </ul>	<p>managed in accordance with construction best-practice. Specifically, the pressure of the mud in drill bores will be monitored continuously to prevent loss of major containment. Liquid wastes (including waste oil based mud (OBM) and OBM cuttings) will be removed by barge (or similar process) and disposed of at a suitability permitted facility onshore. It is anticipated that any waste(s) generated during the offshore will be consolidated and transported onshore for appropriate and licenced treatment and disposal. The guiding principles of the waste management hierarchy will be used to inform the offshore scheme (i.e. the most preferred outcome will be prevention with disposal being the least preferred).</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>no significant effects</b> are anticipated as a result of the construction and operation of the offshore scheme.</p>
Marine Archaeology	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>disturbance to known features of archaeological interest;</li> <li>disturbance to unknown archaeological features; and</li> <li>changes to setting and permanent loss of heritage value as a result of construction disturbance.</li> </ul>	Known and unknown archaeological features, historical wrecks and other potentially valuable features of archaeological interest	<p>A preliminary appraisal of Marine Archaeology has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>permanent and / or temporary loss of unknown archaeological features.</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>A detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures. Sensitive features will be avoided wherever possible, as informed</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
	<p><b>Operation:</b> N/A</p>			<p>by the Environmental Baseline Survey (EBS) process. Where required, pre-works surveys will be completed, as appropriate, to ensure documentation of heritage features.</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>no significant effects</b> are anticipated as a result of the construction and operation of the offshore scheme.</p>
<p>Shipping and Other Users of the Sea</p>	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• construction of the offshore CO<sub>2</sub> Export Pipeline;</li> <li>• UXO clearance;</li> <li>• presence of vessels within and adjacent to fishing grounds; and</li> <li>• presence of vessels within and adjacent to navigational routes.</li> </ul> <p><b>Operation:</b></p> <ul style="list-style-type: none"> <li>• permanent exclusion zones at wellhead / injection sites within the Endurance store area;</li> <li>• presence of manifolds, rock protection and other features on the seabed; and</li> <li>• routine operational vessels and/or aviation traffic.</li> </ul>	<p>Other users of the sea, including commercial fishing traffic, commercial and industrial vessels, military vessels, recreational traffic and inshore (light) recreational vessels</p>	<p>A preliminary appraisal of Shipping and Other Users of the Sea has predicted that effects may include:</p> <ul style="list-style-type: none"> <li>• disturbance to other local marine users;</li> <li>• temporary restrictions to fishing grounds;</li> <li>• Navigational Risk; and</li> <li>• disruption to recreational traffic.</li> </ul>	<p>At this stage, a detailed Environmental Assessment has not been undertaken.</p> <p>A detailed ESIA process will be completed to identify impacts and define appropriate control and mitigation measures. A FLO will be adopted for the duration of construction and in order to help achieve complete awareness of construction works, Notices to Mariners will be secured and publication of works in Fishing News will be carried out, as required. Exclusion zones will be required at drill centres; they will be established to help ensure minimisation of risk to third parties, including fishers. Infrastructure will be subject to marking on relevant on marine charts, as required, and agreed with UKHO. The applicant(s) / undertaker will avoid key shipping features (i.e. shipping lanes,</p>

Aspect	Sources of Effect	Receptors	Potential Effects	Consideration of Significance
				<p>local fishing grounds, navigational assets / major shipping routes etc) wherever possible, as informed by the Environmental Baseline Survey (EBS) process. Where this is not possible, Navigational Risk will be assessed as informed by technical stakeholder discussions.</p> <p>Based on the available information, the outputs from baseline survey activities to-date and professional judgment, <b>moderate adverse (significant) effects</b> are anticipated as a result of permanent exclusion zones at wellheads, and the associated restrictions to commercial fishing activity. For all other construction and operational activity, with the application of best-practice and mitigation, <b>no significant effects</b> are predicted.</p>

## 24.8 Summary and Conclusions

### Combined Effects Conclusions

- 24.8.1 The purpose of this document has been to provide an overview of the onshore and offshore schemes and their respective potential effects to enable the consideration of potential combined effects (i.e. the onshore and offshore schemes that form the wider NZT initiative being developed together in their entirety).
- 24.8.2 Based on the assessment completed, a small number of potential combined effects have been identified which wholly relate to the geographical area of overlap between the separate consents, principally, the Tees Bay. The potential combined effects arising from the onshore and offshore works are marine ecology, ornithology, fisheries and socioeconomics / effects on other users of the sea.
- 24.8.3 For all of these topics, considering the combined effects associated with the onshore and offshore schemes, there are no additional significant effects.

### Wider Effects and 'Project as a Whole'

- 24.8.4 This document recognises the high-level principles of EIA process and the need to consider the 'project as a whole' and also responds to feedback provided through the formal consultation process.
- 24.8.5 A detailed EIA has been undertaken for the onshore scheme, benefitting from the outputs of formal consultation exercises under the Planning Act 2008 and extensive pre-application engagement with relevant stakeholders. Conversely, the offshore scheme is at an earlier and less advanced stage, as discussed in Section 24.3, and therefore the extent and level of information available related to potential offshore effects is limited at this stage.
- 24.8.6 It will be for the EIA for the offshore scheme to fully identify, assess, report and consult on the potential suite of impacts associated with offshore works through the relevant regulatory process (i.e. OGA Carbon Dioxide Appraisal and Storage Licence and Permit, the Petroleum Act 1998 and, depending on regulatory requirements, the Marine and Coastal Access Act 2009).
- 24.8.7 Notwithstanding, in order to aid the Examining Authority and Secretary of State in their consideration of the complete effects arising from both the onshore and offshore works, a summary of potential effects from both schemes has been provided.
- 24.8.8 Regarding the onshore scheme, moderate adverse (significant) effects have been identified related to Landscape and Visual Amenity and are expected to occur at a small number of recreational receptors during construction. In terms of operation, there are expected to be moderate adverse (significant) effects at Viewpoint 7: England Coast Path as a result of the path's close proximity to the PCC Site. However, as far as reasonably practicable, the design of the Proposed Development will seek to minimise adverse impacts on visual amenity through appropriate siting of infrastructure and through the selected building materials and colours, as set out in the Design and Access



Statement (Document Ref. 5.4) that accompanies the Application. Significant (beneficial) effects on socioeconomics and tourism are anticipated as a consequence of construction and operation (including maintenance) of the Proposed Development.

- 24.8.9 Regarding the offshore scheme, moderate adverse (significant) effects are anticipated as a result of permanent exclusion zones at wellheads, and the associated restrictions to commercial fishing activity. Moderate adverse (significant) effects are also anticipated as a result of the completion of UXO clearance, where required. Specifically, this is related to the potential impacts associated with UXO clearance on species with high sensitivity to changes in the underwater soundscape, including the harbour porpoise (*Phocoena phocoena*), the designated feature of the Southern North Sea SAC. These potential impacts will be subject to a detailed Environmental Assessment which will determine, as informed by appropriate stakeholder engagement and formal consultation, the requirement for detailed mitigation measures.
- 24.8.10 All other effects associated with the onshore and offshore schemes are predicted to be Not Significant.

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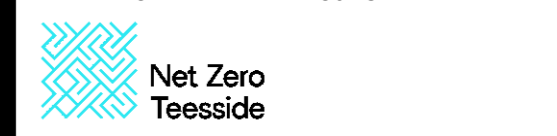
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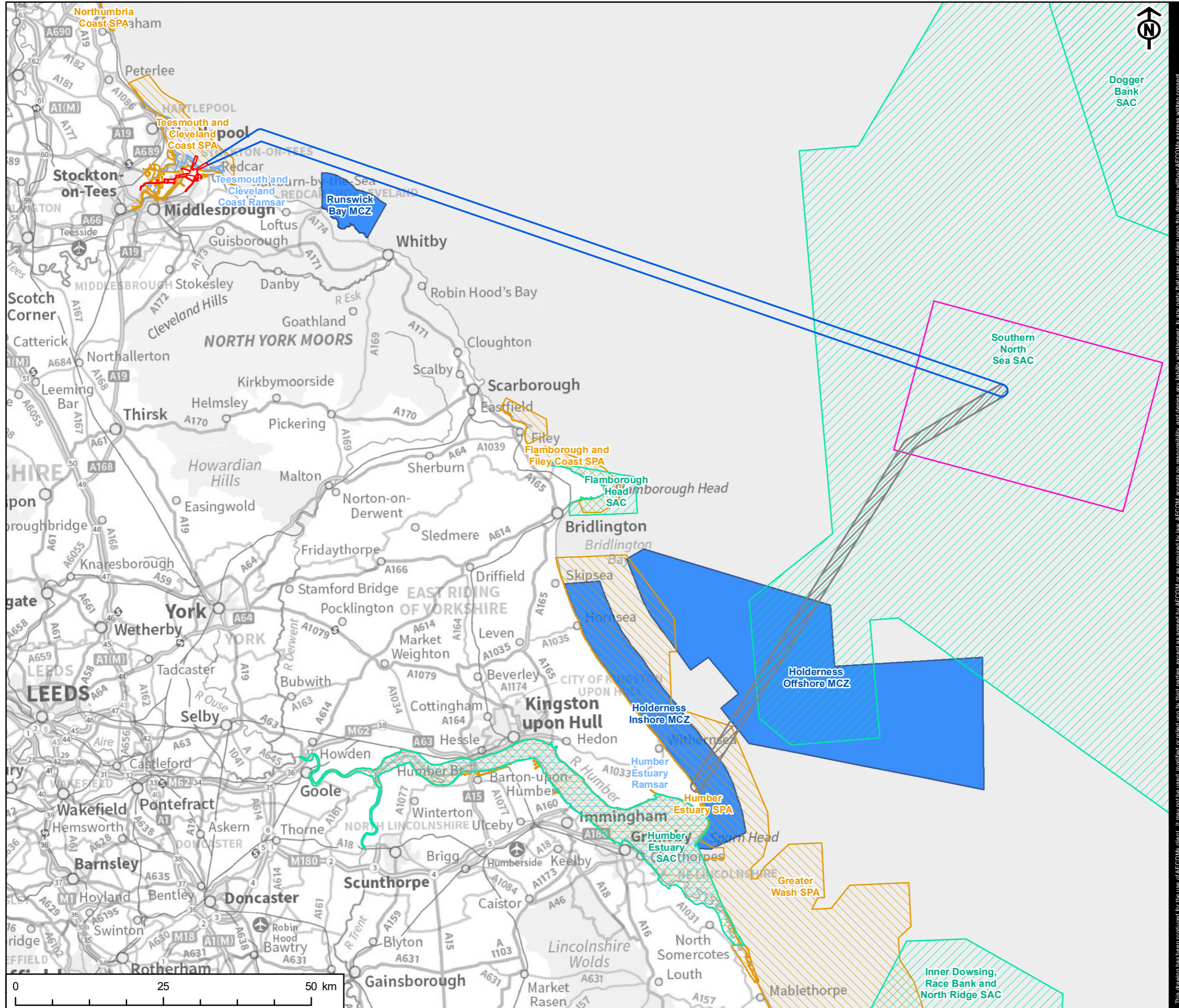
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## Figure 24C-1: Strategic Environmental Constraints



KEY

- Site Boundary
- Indicative CO<sub>2</sub> Export Pipeline Route Corridor - Teesside
- Indicative CO<sub>2</sub> Export Pipeline Route Corridor - Humber \*
- Endurance CO<sub>2</sub> Store
- Special Area of Conservation
- Special Protection Area
- Ramsar
- Marine Conservation Zone



\* A preliminary route corridor is provided for illustration only and is not intended to represent the final route. The preferred pipeline route will be determined in due course and subject to a detailed Environmental Assessment

TITLE  
FIGURE 24C-1  
STRATEGIC ENVIRONMENTAL CONSTRAINTS

REFERENCE  
NZN\_210514\_SOCE\_24C-1\_v2

SHEET NUMBER  
1 of 1

DATE  
14/05/2021

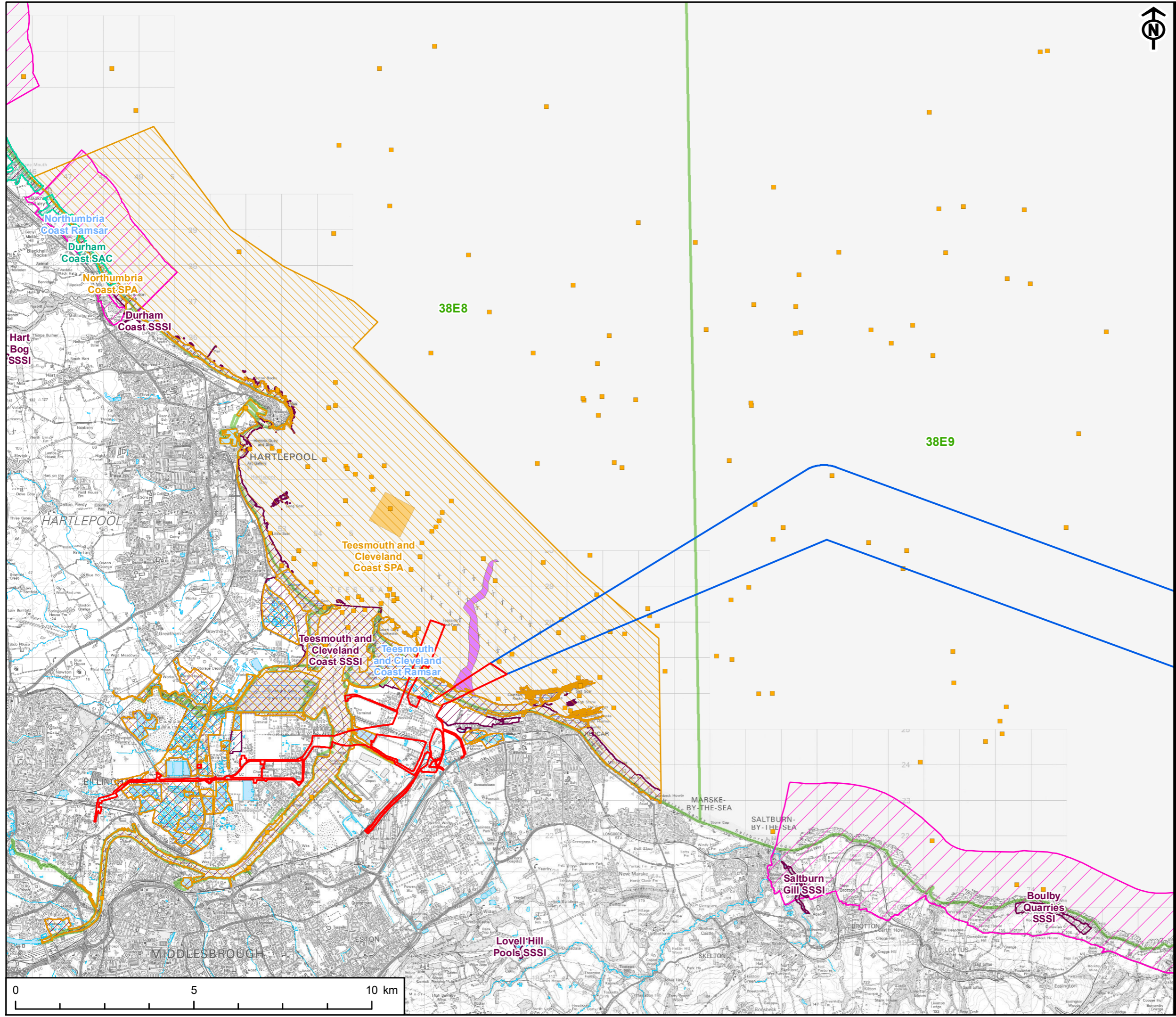
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## Figure 24C-2: Key Marine Constraints (Tees Bay)



KEY

- Site Boundary
- Indicative CO<sub>2</sub> Export Pipeline Route Corridor - Teesside
- UKHO Wrecks and Obstructions - Point
- UKHO Wrecks and Obstructions - Polygon
- Palaeochannel
- Waterbody
- Special Area of Conservation
- Special Protection Area
- Site of Special Scientific Interest
- Ramsar
- Heritage Coast
- Statistical Rectangle (ICES)

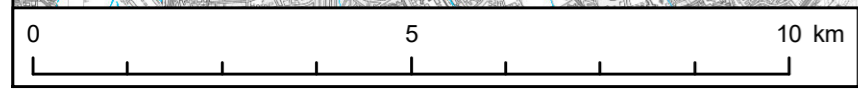


TITLE  
FIGURE 24C-2  
KEY MARINE CONSTRAINTS (TEES BAY)

REFERENCE  
NZN\_210514\_SOCE\_24C-2\_v2

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