



LIGHTHOUSE GREEN FUELS PROJECT

Preliminary Environmental Information Report

Chapter 8: Freshwater and Marine Ecology

The Inspectorate Reference: **EN010150**

May 2024

Volume 1



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8. FRESHWATER AND MARINE ECOLOGY

8.1. INTRODUCTION

- 8.1.1. This Chapter considers the preliminary assessment of the Likely Significant Effects (LSEs) of the Proposed Scheme on freshwater and marine ecology during the Construction and Operation Phase of the Proposed Scheme and describes:
- relevant policy, legislation and guidance;
 - consultation undertaken to date;
 - the methodology for assessment;
 - potential LSEs of the Construction Phase; and
 - potential LSEs of the Operational Phase.
- 8.1.2. This Chapter should be read in conjunction with the following:
- **Chapter 5: Air Quality (Volume 1);**
 - **Chapter 6: Noise and Vibration (Volume 1);**
 - **Chapter 7: Terrestrial Ecology (Volume 1);**
 - **Appendix 7A: Preliminary Ecological Appraisal (PEA) Report (Volume 3); and**
 - **Chapter 9: Water Environment and Flood Risk (Volume 1).**
- 8.1.3. The marine and freshwater ecology and terrestrial ecology assessments comprise two distinct assessments. The information presented in this Chapter does not duplicate information set out in **Chapter 7: Terrestrial Ecology (Volume 1)**.

MATTERS SCOPED OUT

- 8.1.4. Although reference to decommissioning was included in the EIA Scoping Report¹, the intention is to scope out the decommissioning phase from the freshwater and marine ecology assessment going forward. Due to the operational lifespan of the Proposed Scheme (50 years), it is not considered appropriate to accurately determine the unknown characteristics of the future baseline for the freshwater and marine ecology environment. It is therefore intended to scope out the decommissioning phase, completing the assessment of likely significant effects as part of the proposed decommissioning plan.

8.2. POLICY, LEGISLATION, AND GUIDANCE

- 8.2.1. The policy, legislation, and guidance relevant to the assessment of the Proposed Scheme is detailed in **Appendix 4A: Policy, Legislation and Guidance (Volume 3)**. The key policy, legislation, and guidance most relevant to this Chapter are as follows:
- Policy:
 - The Overarching National Policy Statement for Energy (NPS) (EN-1) 2023²;
 - National Planning Policy Framework (NPPF) 2021³;
 - Stockton-on-Tees Borough Council - Local Plan - Adopted 30 January 2019⁴;

- Tees Valley Local Biodiversity Action Plan (LBAP) (updated 2012)⁵;
- Redcar & Cleveland Local Plan 2018⁶;
- North-East inshore Marine Plan Area⁷;
- Salmon Action Plan⁸;
- The UK Marine Policy Statement 2011⁹; and
- A Green Future: Our 25 Year Plan to Improve the Environment 2018¹⁰.
- **Legislation:**
 - The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the ‘Bern Convention’)¹¹;
 - The Oslo and Paris Convention for the Protection of the Marine Environment in the North-East Atlantic 1992 (the OSPAR Convention)¹²;
 - The Agreement on the Conservation of Small Cetaceans in the Baltic, Atlantic, Irish and North Seas (ASCOBANS) 1991¹³;
 - The Convention on Migratory Species of Wild Animals (The Bonn Convention) 1979¹⁴;
 - The Convention for Wetlands of International Importance (Ramsar Convention) 1976¹⁵;
 - The Wildlife and Countryside Act 1981 (as amended) (WCA)¹⁶;
 - The Countryside and Rights of Way (CROW) Act 2000¹⁷;
 - The Natural Environment and Rural Communities Act 2006 (NERC Act)¹⁸;
 - The Conservation of Habitats and Species Regulations 2017 (as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) (‘the Habitats Regulations’)¹⁹;
 - The Environment Act 2021²⁰;
 - Salmon and Freshwater Fisheries Act 1975 (SAFFA)²¹;
 - The Eels (England and Wales) Regulations 2009²²;
 - Conservation of Seals Act 1970 (as amended by the Conservation of Seals Order (England) 1999)²³;
 - The Water Environment (Water Framework Directive) (England and Wales) Regulations (the ‘WFD Regulations’) 2017²⁴;
 - The Environmental Targets (Biodiversity) (England) Regulations 2023²⁵;
 - The Marine and Coastal Access Act 2009²⁶; and
 - The Environmental Protection Act 1990²⁷.
- **Guidance:**
 - CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland²⁸;
 - BS 42020: 2013 Biodiversity — Code of practice for planning and development²⁹;

- Guidance for Pollution Prevention 2023³⁰;
- CIRIA 532 Control of Water Pollution from Construction Sites 2001³¹;
- Clearing the Waters for All 2017³²; and
- North Atlantic Conservation Organisation (NASCO) Implementation plan for the period 2019-2024³³.

8.3. SCOPING OPINION AND CONSULTATION

- 8.3.1. An EIA Scoping Opinion³⁴ was received by the Applicant from the Planning Inspectorate (hereafter referred to as the Inspectorate) on behalf of the Secretary of State on 01 September 2023. The responses from the Inspectorate in relation to freshwater and marine biodiversity and how these requirements should be addressed by the Applicant are set out in **Table 8-1** below.

Table 8-1: Summary of EIA Scoping Opinion in Relation to Freshwater and Marine Ecology

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
Planning Inspectorate			
3.4.1	Interest Features of the Teesmouth and Cleveland Coast SSSI – operation	<p><i>"It is stated that only impacts to breeding harbour seals are proposed to be assessed within the ES for the Operational Phase. The other interest features of the SSSI (namely saltmarshes and invertebrates inhabiting sand dunes) are proposed to be scoped out due to distance from the Proposed Development site. Figure 2.2e shows the location of saltmarshes and sand dunes in relation to the Proposed Development site.</i></p> <p><i>Considering the potential for an air pollution impact pathway to exist the Inspectorate is not content to scope this matter out based on distance from the Proposed Development. The Applicant's attention is drawn to the consultation response from Natural England (Appendix 2 of this Opinion) which highlights that</i></p>	<p>The invertebrates inhabiting the sand dunes are considered terrestrial and are covered within Chapter 7: Terrestrial Ecology (Volume 1).</p> <p>With regards to the saltmarsh component of the SSSI, the likelihood of any impacts occurring would be from the deposition of pollutants in relation to air quality. An assessment of impacts to habitat features of the SSSI is provided in Chapter 5: Air Quality (Volume 1) and will be developed further in the ES.</p> <p>Consultation is ongoing with the EA and NE (Natural England) on how they would like the Applicant to proceed regarding water quality. A summary of further consultation activities after the</p>

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		<p><i>coastal dune and grassland habitats are sensitive to air quality impacts.</i></p> <p><i>Furthermore, it is highlighted (in Paragraph 9.5.14) that water quality impacts are affecting the Teesmouth and Cleveland Special Protected Area (SPA) and Ramsar site. The boundaries for these sites overlap with the SSSI, therefore it is unclear whether there is potential for significant effects to occur to the other interest features of the SSSI. The ES should assess the potential for likely significant effects to occur on all interest features of the Teesmouth and Cleveland Coast SSSI or the evidence to demonstrate the absence of a likely significant effect such as agreement from relevant consultation bodies."</i></p>	<p>submission of this PEIR will be provided in the ES.</p>
3.4.2.	Interest features of Teesmouth National Nature Reserve (NNR) – operation	<p><i>"Impacts to grey seals and harbour seals are proposed to be assessed within the ES however other features of the NNR (namely sand dunes, grazing marsh, intertidal sands and mudflats) are proposed to be scoped out due to the distance from the Proposed Development site</i></p>	<p>Consultation is ongoing with NE on how they would like the Applicant to proceed regarding the marine mammals in this NNR. A summary of further consultation activities after the submission of this PEIR will be provided in the</p>

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		<p><i>and lack of hydrological connectivity. However, it is stated elsewhere in the Scoping Report¹ (e.g. Paragraph 8.5.8) that the Proposed Development site is hydrologically connected to the Teesmouth NNR.</i></p> <p><i>Although the NNR is located 970m from the Proposed Development site (as stated in Table 8-3), based on the hydrological connectivity it is unclear whether there is potential for significant effects to occur. As such the Inspectorate is not content to scope this matter out of further assessment at this stage. There is also the potential for interest features of this NNR to be impacted through changes in air quality and deposition of pollutants. The Applicant's attention is drawn to the consultation response from Natural England (Appendix 2 of this Opinion) which highlights that coastal dune and grassland habitats are sensitive to air quality impacts. The ES should assess the potential for likely significant effects to occur on all interest features of the Teesmouth NNR or provide the</i></p>	<p>Freshwater and Marine Ecology Chapter of the ES.</p> <p>During engagement with NE, the Applicant was advised that due to mixing factors within the Tees Estuary, deposition of pollutants due to changes in air quality is unlikely to impact upon aquatic ecology habitats and species. Furthermore, due to the tidal nature of such habitats, any contaminants are unlikely to build up as they are diluted and removed at each high tide. Therefore, this will be scoped out from further assessment.</p> <p>Air quality impacts to coastal dune and grassland habitats are considered within Chapter 7: Terrestrial Ecology (Volume 1).</p>

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		<i>evidence to demonstrate the absence of a likely significant effect."</i>	
3.4.3	Phytoplankton	<p><i>"The Applicant proposes to scope out impacts to phytoplankton on the basis that standard mitigation measures would be incorporated in relation to water quality to minimise the impact to phytoplankton.</i></p> <p><i>Paragraph 8.5.35 states that phytoplankton taxa which cause harmful algal blooms and fish mortality are present within the Tees Estuary.</i></p> <p><i>No details regarding the standard mitigation measures are provided within the Scoping Report¹. On the basis of the information provided the Inspectorate is not in a position to scope this matter out at this stage. Furthermore, since phytoplankton species are present within the Tees Estuary (albeit harmful species) there is potential that the Proposed Development could lead to significant effects in the absence of</i></p>	<p>During engagement with the EA, it was indicated that phytoplankton surveys will not be required within the Tees Estuary. Phytoplankton are regularly monitored by the EA with the estuary which will highlight any harmful algae blooms that may occur. However, the need for further assessment was determined and this topic is now scoped into the Freshwater and Marine assessment.</p> <p>Surface water runoff is likely to affect phytoplankton communities. Mitigation measures regarding the management of surface water runoff is presented in Chapter 9: Water Environment and Flood Risk (Volume 1). All effluent and wastewater from the proposed scheme will be treated before discharge. Standard mitigation measures for the Proposed Scheme in relation to</p>

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		<i>mitigation measures. The ES should assess the potential for likely significant effects to occur on phytoplankton or the information referred to demonstrating agreement with the relevant consultation bodies and the absence of a likely significant effect."</i>	Phytoplankton are provided in this Chapter (see Section 8.7).
3.3.4	Marine plants and macroalgae	<p><i>"The Applicant proposes to scope out impacts to marine plants and macroalgae on the basis that standard mitigation measures would be incorporated in relation to water quality. Impacts to saltmarsh and native seagrass habitats are ruled out due to distance of these habitats from the Proposed Development. The location of coastal saltmarsh is shown on Figure 2.3a. The specific location of native seagrass habitats are not provided however Paragraph 8.5.37 states that restoration projects are taking place approximately 5km downstream.</i></p> <p><i>Considering saltmarsh is an interest feature of internationally and nationally designated sites within the Tees Estuary the Inspectorate would</i></p>	A marine habitat survey is to be undertaken (Please refer to Table 8-3 for further survey details) to identify marine habitats and flora relevant to the Proposed Scheme. This should identify whether further marine macrophyte and macroalgae will be scoped in and whether surveys will be required. If further surveys are deemed necessary, then the results of these will also be included within the ES. In the absence of this survey data this topic is scoped into the Freshwater and Marine Ecology assessment.

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		<p><i>expect this impact pathway to be assessed within the ES.</i></p> <p><i>Paragraph 8.5.36 states that “data regarding marine plants and macroalgae in the Study Area is limited”. In the absence of further information including the specific location of habitats and proposed mitigation measures for reducing impacts to water quality, the Inspectorate is not in a position to scope this matter out at this stage. The ES should assess the impact of the Proposed Development on marine plants and macroalgae during construction and operation, particularly operational impacts resulting from nitrogen loading from wastewaters or the information demonstrating agreement with the relevant consultation bodies and the absence of a likely significant effect. The Applicant's attention is drawn to Environment Agency's consultation response (Appendix 2 of this Opinion) in this regard.”</i></p>	<p>The risk to the coastal saltmarsh habitat within the SSSI will be assessed within the ES.</p> <p>A marine habitat survey is scheduled as in Table 8-3. Following the marine habitat survey further targeted marine plants and macroalgae surveys may be required. This will be covered in the ES.</p>

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3.4.5	Marine mammals in Greater North Sea Ecoregion	<p><i>"Impacts to harbour seals, grey seals, and harbour porpoises are proposed to be assessed within the ES due to their presence within the Tees Estuary. Other marine mammals within the Greater North Sea Ecoregion (namely minke whale, bottlenose dolphin, white beaked dolphin, orca, Atlantic white-sided dolphin, long-finned pilot whale, Risso's dolphin, and short-beaked common dolphin) are proposed to be scoped out due to their unlikely presence in the estuary.</i></p> <p><i>Considering the nature of these species and the location of the Proposed Development site the Inspectorate is content to scope this matter out of further assessment on the basis that significant effects are unlikely to occur."</i></p>	No response required.
3.4.6	Study Area	<p><i>"Table 8-2 describes the ZOI for freshwater and marine receptors. A Study Area of 10km is used for internationally designated sites and 2km for nationally and locally designated sites, with these areas</i></p>	The Zoi has been established in line with guidance provided by CIEEM (2017 ³⁵ and 2020 ³⁶). As per this guidance, nationally designated sites (including SSSI, NNR and LNR) have been

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		<p><i>extending if designated features are highly mobile.</i></p> <p><i>Table 8-3 lists the nationally designated sites within 2km of the site, namely Teesmouth and Cleveland Coast SSSI and Teesmouth NNR. Paragraph 8.5.8 states that Berwick Hills LNR is the only locally designated site located within 2km of the site.</i></p> <p><i>It is unclear how the ZOI presented in Table 8-2 have been defined. Paragraph 9.5.11 of the Water Environment and Flood Risk section of the Scoping Report¹ states that Seaton Dunes and Common SSSI and LNR is hydrologically connected to the Proposed Development site.</i></p> <p><i>This site is located approximately 4.5km downstream of the Site albeit outside of the ZOI.</i></p> <p><i>The ES should assess likely significant effects to all designated sites where an impact pathway (such as due to hydrological connectivity) exists. The ZOI should</i></p>	<p>identified within 2km of the Site. This distance is considered sufficient to capture the majority of potential impacts beyond the Site, based on the nature and scale of the Proposed Scheme.</p> <p>For this Chapter, designated sites have only been considered if <i>'they include features relating to freshwater and/or marine biodiversity, including aquatic habitats and species'</i> but may be extended <i>'if there is a designated feature(s) of a particular site that is highly mobile and may be present within the vicinity of the Site'</i>. It must be noted that nationally designated sites within 2km of the Site which include terrestrial habitats and species will be covered in Chapter 7: Terrestrial Ecology (Volume 1).</p> <p>The Seaton Dunes and Common SSSI and LNR forms part of the Teesmouth and Cleveland Coast SSSI. Any aquatic biodiversity features will be covered in the</p>

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		<i>be defined by the extent of likely significant effects rather than being based on a fixed distance."</i>	Teesmouth and Cleveland Coast SSSI section of the ES.
3.4.7	Surveys	<p><i>"Paragraph 8.11.4 states that "ecological data is usually valid for 18 months" and Paragraph 8.11.5 states that "survey data will provide a snapshot of the ecological baseline at the time of the survey". Some of the desk-based data gathered from the Environment Agency's Ecology and Fish Data Explorer relies on surveys conducted more than 18 months ago, including surveys conducted in 2015. Although it is noted (in Paragraphs 8.7.3 and 8.10.21) that additional surveys may be conducted, the wording suggests these surveys are not certain.</i></p> <p><i>The ES should ensure a robust baseline has been established based on up-to-date data wherever possible. The Applicant should seek agreement from relevant consultees</i></p>	<p>This was the most up to date data available from the desk study sources used. Therefore, further marine and freshwater surveys are to be undertaken, details of which can be found in Table 8-3. This will ensure that a robust baseline is provided as part of the ES assessment.</p> <p>Engagement is ongoing with NE to confirm the methodology for the marine mammal surveys. A summary of further consultation activities after the submission of this PEIR will be provided in the ES.</p> <p>Following consultation, the EA have indicated that phytoplankton surveys will not be required within the Tees Estuary. Phytoplankton are regularly monitored by the EA with the estuary which will highlight any harmful algae</p>

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		<i>regarding the scope and detail of surveys."</i>	blooms that may occur. However, the need for further assessment was determined and this topic is now scoped into the freshwater and marine assessment.
3.4.8	Impact pathways	<i>"The Scoping Report¹ lists the potentially significant effects during the Construction and Operation Phases but does not refer to the potential for changes in air quality and deposition of pollutants. This impact pathway should be assessed where there is the potential for likely significant effects."</i>	<p>Relevant information from the air quality assessment relating to impact pathways to aquatic ecological receptors will be included in the Freshwater and Marine Ecology Chapter of the ES.</p> <p>The methodology for the air quality assessment in relation to designated sites, along with an assessment of potential likely significant effects, is provided in Chapter 5: Air Quality (Volume 1). This will be developed further in the ES when full baseline data from the air quality assessment is available.</p> <p>With regards to the Tees Estuary, NE have advised that due to mixing factors deposition of pollutants due to changes in air</p>

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			quality is unlikely to impact upon aquatic ecology habitats and species and as such they will not be considered further in this assessment.
3.4.9	Marine Mammals Surveys	<i>"It is noted in paragraph 8.10.22 that marine mammal surveys are proposed "if marine works are required". The wording of this phrase suggests that surveys may not be conducted. Considering the Proposed Development proposes to utilise marine transport during construction, operation, and decommissioning the ES should ensure that the baseline is sufficiently robust to allow an assessment of likely significant effects. Effort should be made to agree the extent and scope of surveys."</i>	The Applicant is currently engaging with NE on how they would like the Applicant to proceed in relation to marine mammal surveys. A summary of further consultation activities after the submission of this PEIR will be provided in the ES.
Environment Agency Page 1	Basis of Assessment	<i>"We are generally satisfied with the proposed scope and methodology outlined in chapter 8. However, it is noted that cooling is mentioned within the Scoping Report¹, but no details have been provided. Impacts</i>	The Applicant is able to confirm that there will be no cooled water discharged into the River Tees and no abstraction will be

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		<p><i>of cooling water (abstraction and discharge) may need to be scoped in. The applicant should consider the following:</i></p> <p><i>Will waste water be used for cooling or water abstracted from a Water Framework Directive water body?</i></p> <p><i>- Is this from an existing or new abstraction point?</i></p> <p><i>- Where will the water be abstracted from and discharged to?</i></p> <p><i>- Will there be any thermal impacts?</i></p> <p><i>Impacts to fish including entrainment and the requirements of the Eels Regulations 2009 should also be considered."</i></p>	<p>required. This has now been discussed with the EA.</p> <p>Impacts to fish will be fully assessed within the ES.</p>
Natural England Page 1	Basis of assessment	<i>"A robust assessment of environmental impacts and opportunities, based on relevant and up to date environmental information, should be undertaken</i>	A robust assessment of potential impacts has been (and will continue to be) undertaken in line with the methodology described in the sections below.

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<p><i>prior to an application for a Development Consent Order.</i></p> <p><i>Natural England and the applicant are engaged in ongoing discussions on a number of impacts that we have highlighted as having the potential to adversely affect the nearby designated sites of nature conservation. Based on these discussions, we are confident that the applicant will undertake the required assessments and surveys to identify where impacts are likely, which will inform any further mitigation measures."</i></p>	<p>The Applicant will continue to engage with NE where necessary and will undertake the marine and freshwater ecology assessment in line with any agreed scope that comes out of these discussions.</p>
Natural England Page 2	General principles	<p><i>"Through ongoing discussions with the Applicant and a review of the Lighthouse Green Fuels Environmental DCO: Impact Assessment Scoping Report¹ (July 2023) Natural England is confident that the general principles (set out below) will be addressed through the ES.</i></p> <p><i>Regulation 11 of the Infrastructure Planning Regulations 2017 - (The</i></p>	<p>The Applicant can confirm that the principles set out by NE will all be included in the ES.</p>

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<p><i>EIA Regulations) sets out the information that should be included in an environmental Statement (ES) to assess impacts on the natural environment. This includes:</i></p> <ul style="list-style-type: none"> ■ <i>A description of the development – including physical characteristics and the full land use requirements of the site during construction and operational phases.</i> ■ <i>Appropriately scaled and referenced plans which clearly show the information and features associated with the development.</i> ■ <i>An assessment of alternatives and clear reasoning as to why the preferred option has been chosen.</i> ■ <i>A description of the aspects and matters requested to be scoped out of further assessment with adequate justification provided.</i> ■ <i>Expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation etc.) resulting</i> 	

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		<p><i>from the operation of the proposed development.</i></p> <ul style="list-style-type: none"> ■ <i>A description of the aspects of the environment likely to be significantly affected by the development including biodiversity (for example fauna and flora), land, including land take, soil, water, air, climate (for example greenhouse gas emissions, impacts relevant to adaptation, cultural heritage and landscape and the interrelationship between the above factors.</i> ■ <i>A description of the likely significant effects of the development on the environment – this should cover direct effects but also any indirect, secondary, cumulative, short, medium, and long term, permanent and temporary, positive, and negative effects. Effects should relate to the existence of the development, the use of natural resources (in particular land, soil, water and biodiversity) and the emissions from pollutants. This should</i> 	

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		<p><i>also include a description of the forecasting methods to predict the likely effects on the environment.</i></p> <ul style="list-style-type: none"> ■ <i>A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.</i> <p><i>An outline of the structure of the proposed ES"</i></p>	
<p>Natural England Page 3</p>	<p>Biodiversity and Geodiversity</p>	<p><i>"The assessment will need to include potential impacts of the proposal upon sites and features of nature conservation interest as well as opportunities for nature recovery through biodiversity net gain (BNG). There might also be strategic approaches to take into account.</i></p> <p><i>Ecological Impact Assessment (EclA) is the process of identifying, quantifying, and evaluating the potential impacts of defined actions on ecosystems or their components. EclA may be carried out as part of the EIA process or to support other forms of environmental assessment</i></p>	<p>The assessment within this PEIR considers impacts on sites and features of nature conservation interest, and this will be developed further in the ES when additional baseline information is available.</p> <p>A BNG assessment is to be undertaken for the Proposed Scheme, and a BNG technical appendix detailing the results of the assessment completed will be provided with the ES.</p> <p>The marine and freshwater ecology assessment is being carried out in line with CIEEM's</p>

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		<i>or appraisal. Guidelines have been developed by the Chartered Institute of Ecology and Environmental Management (CIEEM)."</i>	Guidelines for Ecological Impact Assessment ²⁸ .
Natural England Page 4	International Habitats and Sites	<p><i>"The development site is within or may impact on the following nature conservation sites, which are part of the National Site Network or have been internationally designated:</i></p> <ul style="list-style-type: none"> ■ <i>Teesmouth and Cleveland Coast Special Protection Area</i> ■ <i>Teesmouth and Cleveland Coast Ramsar site</i> <p><i>The ES should thoroughly assess the potential for the proposal to affect internationally designated sites of nature conservation importance / Habitats sites, including marine sites where relevant. This includes Special Protection Areas (SPA), Special Areas of Conservation (SAC), listed Ramsar sites, candidate SAC and proposed SPA.</i></p>	<p>By nature of the designation, SPA's relate to birds and therefore are not considered in this freshwater and marine chapter. Potential direct and indirect impacts to designated sites through impacts to water quality including the Teesmouth and Cleveland Coast Special Protection Area and the potential impact to the designated site are discussed in Chapter 7: Terrestrial Ecology (Volume 1).</p> <p>For this assessment, none of the qualifying features of the Teesmouth and Cleveland Coast Ramsar site are freshwater and marine habitats or species. The qualifying features are birds. Potential impacts relating to the Ramsar Site are discussed in</p>

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		<p>Potential Noise/Visual Disturbance Impacts</p> <p><i>The Proposed Development has the potential to result in noise and visual to the qualifying features of the SPA/Ramsar. Natural England recommends an approach to noise assessments that considers the likely maximum noise levels, as well as the change from average baseline noise. Where there is a 3dB change from the baseline, we recommend that further investigation should be undertaken to determine the site's qualifying features could be affected and what those effects would be. This should consider the frequency and duration of likely impacts.</i></p> <p><i>Visual disturbance could occur where construction or operational activities are located in close proximity to important areas of the SPA/Ramsar for the qualifying features. Natural England recommends that any significant short-term activities or long-term operations that would create new</i></p>	<p>Chapter 7: Terrestrial Ecology (Volume 1).</p> <p>Furthermore, a HRA screening has been undertaken (see Appendix 7B: Information to Inform a HRA Screening (Volume 3)). The screening assessment concluded Likely Significant Effects to internationally designated sites and therefore an Appropriate Assessment (AA) will be undertaken and a report submitted alongside the DCO.</p>

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<p><i>source of visual disturbance should be considered in the assessment.</i></p> <p>Potential Air Quality Impacts</p> <p><i>The Proposed Development is likely to result in emissions of pollutants and nutrients that have the potential to adversely affect the supporting habitats of the site's qualifying features. Therefore, a robust approach to assessing these impacts should be taken in the ES.</i></p> <p>Potential Water Quality Impacts</p> <p><i>The Proposed Development has the potential to result in the discharge of process-related wastewaters, which may contain nitrogen and/or other pollutants that could negatively impact the water quality of the SPA.</i></p> <p><i>In March 2022, Natural England issued advice to all competent authorities regarding the impacts of excess levels of nitrogen and phosphorous on certain Habitats Sites. The Teesmouth and Cleveland Coast SPA/Ramsar is</i></p>	

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<i>subject to this advice as a result of excess levels of nitrogen in the Tees Estuary, which have resulted in the growth of opportunistic macroalgae on key foraging grounds for the site's qualifying features."</i>	
Natural England Page 6	Nationally Designated Sites – Sites of Special Scientific Interest	<p><i>"The development site is within or may impact on the following Site of Special</i></p> <p><i>Scientific Interest (SSSI):</i></p> <ul style="list-style-type: none"> ■ <i>Teesmouth and Cleveland Coast SSSI</i> <p><i>The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within the SSSI and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects.</i></p> <p><i>Features which the ES will need to consider:</i></p>	<p>The Applicant can confirm that the ES will include a full assessment of direct and indirect effects of the Proposed Scheme on features of special interest within the SSSI and identify appropriate mitigation measures to avoid, minimise or reduce any adverse significant effects.</p> <p>Potential impacts to common seal from noise and visual disturbance (and other factors) is covered in this Chapter and will be developed further in the ES. The other features highlighted by NE for consideration including aggregations of breeding birds, aggregations of non-breeding birds, fixed dune grassland, humid dune slacks, invertebrate assemblage, and sand dune; strandline, embryo and mobile</p>

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<ul style="list-style-type: none"> ■ <i>Aggregations of breeding birds;</i> ■ <i>Aggregations of non-breeding birds;</i> ■ <i>Common seal, Phoca vitulina</i> ■ <i>Fixed dune grassland</i> ■ <i>Humid dune slacks</i> ■ <i>Invertebrate assemblage</i> ■ <i>Sand dune; strandline, embryo and mobile dunes</i> <p><i>Our advice regarding the potential impact pathways on the Teesmouth and Cleveland Coast SSSI broadly coincides with those set out (in relation to the SPA/Ramsar). However, we highlight that Teesmouth and Cleveland Coast SSSI is designated for a wider</i></p> <p><i>range of birds, Common Seal, coastal dune habitats, and geological features. Therefore, potential impacts on these features should also be considered in the relevant assessment. In particular, we would like to highlight the following potential impacts:</i></p>	<p>dunes will be covered in Chapter 7: Terrestrial Ecology (Volume 1).</p> <p>An assessment of impacts to habitat features of the SSSI is provided in Chapter 5: Air Quality (Volume 1) and will be developed further in the ES.</p>

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<p>Noise and Visual Disturbance</p> <p><i>Common Seal are particularly vulnerable to impacts from noise and disturbance during the pupping season and to a lesser extent during the moulting season. Therefore, any activities located in a relevant location that are likely to cause disturbance should be scheduled to take place outside of these periods.</i></p> <p>Air Quality</p> <p><i>Coastal dune and grassland habitats are sensitive to changes in air quality and the deposition of pollutants (nutrient nitrogen and ammonia). The applicant has stated that a full air quality assessment will be undertaken and will have regard to the relevant critical loads and levels."</i></p>	
Natural England Page 7	Protected Species	<i>"The ES should assess the impact of all phases of the proposal on protected species (including, for example, great crested newts, reptiles, birds, water voles, badgers</i>	The method of assessment of potential likely significant effects arising from the Proposed Scheme (during construction and operation) is detailed in Section

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<p><i>and bats). Natural England does not hold comprehensive information regarding the locations of species protected by law. Records of protected species should be obtained from appropriate local biological record centres, nature conservation organisations and local groups. Consideration should be given to the wider context of the site, for example in terms of habitat linkages and protected species populations in the wider area.</i></p> <p><i>The area likely to be affected by the development should be thoroughly surveyed by competent ecologists at appropriate times of year for relevant species and the survey results, impact assessments and appropriate accompanying mitigation strategies included as part of the ES. Surveys should always be carried out in optimal survey time periods and to current guidance by suitably qualified and, where necessary, licensed, consultants."</i></p>	<p>8.4, below. This will be developed and refined, where necessary, for the ES. The EA Ecology and Fish Data Explorer⁴¹ has been used to identify records of protected or otherwise notable species relevant to the Proposed Scheme.</p> <p>The Site and a wider Study Area are being assessed by competent, experienced aquatic ecologists, with surveys being carried out during appropriate seasonal windows, where necessary, following current best practice guidance. Licensed surveyors will be used where determined to be necessary. A full impact assessment and recommendations for mitigation measures will be included in the ES.</p>

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
Natural England Page 8	Priority Habitats and Species	<p><i>"An appropriate level habitat survey should be carried out on the site, to identify any important habitats present. In addition, ornithological, botanical, and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present.</i></p> <p><i>The Environmental Statement should include details of:</i></p> <ul style="list-style-type: none"> ■ <i>Any historical data for the site affected by the proposal (e.g. from previous surveys)</i> ■ <i>Additional surveys carried out as part of this proposal</i> ■ <i>The habitats and species present</i> ■ <i>The status of these habitats and species (e.g. whether priority species or habitat)</i> ■ <i>The direct and indirect effects of the development upon those habitats and species</i> ■ <i>Full details of any mitigation or compensation measures</i> 	<p>An aquatic habitat survey has been carried out at the Site as part of the Preliminary Ecological Appraisal (PEA) to identify any freshwater and marine habitats present.</p> <p>Information on ornithological, botanical, and invertebrate surveys is covered in Chapter 7: Terrestrial Ecology (Volume 1).</p> <p>The ES will include information relating to all of the points listed by NE.</p>

ID	Applicant's Proposed Matters to Scope out / Description	Scoping Opinion Comments	Applicant's Response
		<i>Opportunities for biodiversity net gain or other environmental enhancement."</i>	
	Climate Change	<i>"The England Biodiversity Strategy published by DEFRA establishes principles for the consideration of biodiversity and the effects of climate change. The ES should reflect these principles and identify how the development's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained. The NPPF requires that the planning system should contribute to the enhancement of the natural environment 'by establishing coherent ecological networks that are more resilient to current and future pressures' (NPPF Para 174), which should be demonstrated through the ES."</i>	Section 8.6 of this Chapter outlines the Freshwater and Marine Ecology assessment's approach to future baseline, which includes a consideration of the future climate change trends and their implications on biodiversity and specifically freshwater and marine receptors.

Table 8-2: Summary of Consultation Undertaken to Date

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
08 June 2023, DAS meeting (online)	Natural England	<p>A meeting was held to confirm the approach to deliver the required nitrogen neutrality assessment and mitigation strategy (NNAMS).</p> <p>NE confirmed that the only offsite water discharge that should be considered in the NNAMS is the treated industrial process effluent discharged to Bran Sands Wastewater Treatment Plant (WWTP) for further treatment prior to being discharged to the River Tees.</p> <p>NE also confirmed that the nitrogen load calculation should be based on the total nitrogen discharge concentration (27mg/l) in treated effluent discharged from Bran Sands WWTP.</p>
10 August 2023, DAS meeting (online)	Natural England	<p>The scope of the noise assessment in relation to birds was discussed. NE suggested identifying locations along the River Tees to monitor noise levels in relation to shipping movements and wharf activity. The Applicant and NE agreed that proposed locations would be presented to NE prior to the start of monitoring to confirm their suitability.</p> <p>The Applicant presented the proposed methodology for assessing noise impacts on birds and NE advised that the key measure of significant impacts would be a 3dB change at the receptor above the current baseline.</p> <p>The proposed air quality assessment methodology was presented by the Applicant. NE advised that they would need to defer to an air quality specialist to confirm the suitability, but in general it was considered that the methodology was in line with what they would expect.</p> <p>Contour plots for both noise and air quality monitoring were highlighted by NE as being key deliverables.</p>

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
10 October 2023, DAS meeting (online)	Natural England	<p>The Applicant provided an update on the aquatic ecology surveys completed to date and explored the following:</p> <ul style="list-style-type: none"> • The unexpected presence of saltmarsh within the Site and related assessment methodology. • How this will be assessed in relation to the baseline and future baseline. • The need for additional surveys in relation to phytoplankton and marine mammals. The Applicant agreed to explore phytoplankton surveys further with the EA. • NE are happy with the proposed noise monitoring locations. The Applicant requested further clarity on the 3dB change against which noise impacts would be screened into the assessment. • NE advised on a recent change in critical load values for certain habitats on the Air Pollution Information System (APIS) and that there was still a lack of clarity on some of them, so this should be kept in mind for the assessment. • NE advised that due to the mixing factors in the Tees Estuary, it will likely reduce pollutant concentrations below levels that are likely to impact freshwater and marine species.
06 November 2023	Environment Agency	<p>The purpose was to discuss the WFD assessment, BNG, water quality and aquatic ecology. The principal topics of discussion and outcomes were:</p> <ul style="list-style-type: none"> • Agreement on the scope and location of marine fish and benthic invertebrate surveys. Surveys are planned to take place in Winter 2023 and Spring 2024. The EA advised that they would provide their position on survey timings for fish, but the locations were noted to be acceptable in general. • The Applicant should consider the need to survey fish in the watercourse that flows from Dorman's Pool. • The location for benthic fauna surveys and sediment scrapes for contaminant

Date and Method of Consultation	Consultee	Summary of Key Topics Discussed and Key Outcomes
		<p>analysis. The EA suggested spreading out the locations to include the River Tees downstream.</p> <ul style="list-style-type: none"> The EA advised additional phytoplankton surveys are unlikely to be required as it is regularly monitored by them. The EA advised that marine mammals are not in their remit and that NE should be consulted but that marine mammal surveys may be required if physical works are proposed to Clarence Wharf (Option 2, as described in Chapter 2: Site and Proposed Scheme Description (Volume 1)) but consultation with NE would confirm this. An email update from the EA advised estuarine fish surveys would need to be undertaken in spring (May to June) and autumn (September to October which can be extended the end of November). The EA confirmed that the proposed survey locations look appropriate, and there is no need to move sites further downstream.

8.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

- 8.4.1. The freshwater and marine ecology assessment for the Proposed Scheme has been undertaken in line with the policy, legislation and guidance summarised in **Section 8.2**.

POTENTIALLY SIGNIFICANT EFFECTS

- 8.4.2. As identified in the EIA Scoping Report¹, the following effects are considered to be potentially significant, and have been considered further in this assessment:

CONSTRUCTION PHASE

- 8.4.3. The Proposed Scheme has the potential for likely significant effects during the construction phase, these could include:
- Potential damage, degradation or loss of habitats within designated conservation sites, or disturbance of aquatic species that inhabit these designated sites;
 - Increased pollution risks from spillage of fuels or other harmful substances that may spill directly into or migrate to surface water, which could negatively impact aquatic habitats and species through direct and indirect disturbance and/or degradation;

- Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering;
- Changes to water quality within the River Tees associated with potential works to existing wharfs, and potential disturbance of bed materials from piling and increased wave wash (from increased navigation);
- Loss or physical disturbance/degradation of marine habitats (including Priority Habitat) and species within the River Tees associated with potential improvement works to the existing wharfs and increased navigation;
- Changes in the behaviour due to disturbance (e.g. avoidance) and/or physical damage to fish and marine mammals present within the River Tees due to changes in the underwater soundscape during potential improvement works to existing wharfs and increased navigation;
- Disturbance/avoidance behaviours in pinnipeds due to changes in the airborne soundscape during construction works. Notably, avoidance/disturbance to haul out or breeding locations;
- Disturbance to fish and marine mammals present within the River Tees due to changes in visual stimuli (notably artificial light spill) during potential improvement works to Clarence Wharf;
- Vessel strikes/collisions with marine mammals within the River Tees due to increased navigation; and
- Potential spread of INNS during construction activities through vessel/vehicle movements.

OPERATION PHASE

8.4.4. The operation of the Proposed Scheme has the potential for likely significant effects on aquatic receptors, these could include:

- Polluted surface water runoff; spillage risks containing silts, hydrocarbons or other harmful chemicals and treated effluent/wastewater that may migrate or be discharged to surface water features, which could negatively impact aquatic habitats and species through direct and indirect disturbance and/or degradation.
- Changes to water quality (including suspension of sediment bound contaminants) within the River Tees associated with operational navigation (resulting from wave wash disturbing sediment) and the discharge of treated effluent/wastewater. This could negatively impact benthic communities, phytoplankton, fish, marine macroalgae, and marine mammals (pinnipeds and harbour porpoise).
- Disturbance, avoidance and/or physical damage to fish, pinnipeds and harbour porpoise present within the River Tees due to changes in the underwater soundscape within the River Tees associated operational navigation.
- Disturbance/avoidance behaviours in pinnipeds (notably in haul out/breeding locations) due to changes in the airborne soundscape associated with the operation of the Proposed Scheme.

- Disturbance to fish and marine mammals present within the River Tees due to changes in visual stimuli, (notably artificial light spill) associated with the operation of the Proposed Scheme and increased navigation.
- Vessel strikes/collisions with pinnipeds and harbour porpoise within the River Tees due to operational navigation.
- Potential spread of INNS during operational navigation.

8.4.5. Specific operational impacts for the Proposed Scheme have not yet been defined and will be subject to further assessment.

SUMMARY OF SENSITIVE RECEPTORS

8.4.6. Following on from the scoping undertaken, (as detailed in **Chapter 8: Marine and Freshwater Ecology (Volume 1)** of the **EIA Scoping Report¹**) the following comprise the defined list of Important Ecological Features (IEFs) to be considered as part of the marine and freshwater ecology assessment:

Designated Sites

Statutory Designated Sites

- Teesmouth and Cleveland Coast SPA and Ramsar;
- Teesmouth and Cleveland Coast SSSI;
- Teesmouth National Nature Reserve (NNR); and
- Berwick Hills LNR.

Non-Statutory Designated Sites

- Greatham Creek North Bank Saltmarsh LWS; and
- Greenabella Marsh LWS.

Protected and Notable Species

- Aquatic macroinvertebrates;
- Macrophytes;
- Freshwater Fish;
- Marine Benthic Communities;
- Marine Phytoplankton;
- Marine plants and macroalgae;
- Marine Fish;
- Marine Mammals; and
- Invasive non-native species (INNS).

BASELINE DATA COLLECTION

Overview

- 8.4.7. The freshwater and marine ecology baseline has been (and is being) determined through a combination of desk study and field surveys. The extents of individual receptor Study Areas applied during the baseline data gathering exercise have also been identified. Further information on this is provided in **Section 8.5**, below. Information on baseline data collection in relation to individual receptors will also be included within **Appendix 7A: Preliminary Ecological Appraisal (Volume 3)** and **Chapter 7: Terrestrial Ecology (Volume 1)** and in species-specific reports to be provided as appendices to the ES.

Desk Study

- 8.4.8. A preliminary desk study has been completed for the Site and wider ZoI following best practice guidelines²⁸. The desk study has included a review of publicly available resources and databases to determine the presence of protected species and designated sites. The search radii are outlined in **Table 8-7** below.
- 8.4.9. The baseline information for freshwater and marine biodiversity has been collated from the following publicly available sources:
- Defra's Multi-Agency Geographic Information for the Countryside (MAGIC) online map application³⁷;
 - Open source 1:25,000 Ordnance Survey dataset³⁸;
 - The Rivers Trust River Obstacles map application³⁹;
 - Environment Agency (EA) Catchment Data Explorer⁴⁰;
 - EA Ecology and Fish Data Explorer⁴¹;
 - EA Water Quality Archives⁴²;
 - Tees Estuary Edges – case studies⁴³;
 - International Union for Conservation of Nature (IUCN) Red List⁴⁴; and
 - Available grey literature and technical reports for projects on the River Tees, Tees estuary and surrounding inshore areas^{45 46 47 48 49 50 51 52 53 54 55}.

Field survey

- 8.4.10. Field surveys are ongoing to gather data which will inform freshwater and marine ecology assessment. An initial aquatic habitat survey was undertaken in August 2023. This initial habitat survey helped to identify the requirements for further detailed and targeted species surveys.
- 8.4.11. The results of these further targeted surveys will be used to inform the design of the Proposed Scheme and support the EIA. Surveys will continue until a full baseline data set is available to inform the EIA. The data from further surveys that will be presented in relevant survey reports as part of the ES, depending on time scales.

- 8.4.12. Consultation with NE is ongoing as to whether they will require marine mammal surveys. Following consultation with the EA, it was determined that phytoplankton surveys are not required (see **Table 8-2**).
- 8.4.13. Surveys will be completed in line with relevant current good practice guidelines. Where there are deviations from best practice, approaches to survey effort will be discussed with relevant consultees and survey methods and/or limitations detailed within the EIA.
- 8.4.14. The surveys that are to be undertaken are summarised in **Table 8-3** below. The survey approach has been developed in consultation with the EA and Natural England.

Table 8-3: Field Survey Schedule

Survey	Dates	Scope and Method Detail
Scoping Survey	April to May 2024	An additional scoping survey in order to identify potential future survey requirements as a result of amendments to the DCO Application Boundary.
Aquatic macroinvertebrates	March to May 2024 and September to November 2024	Aquatic macroinvertebrate samples will be collected in Spring and Autumn using standard industry methodologies (3-minute kick/sweep) from the freshwater ditch and five channels of the saltmarsh within Area 8 (Shown in Figure 2 of Appendix 7A: Preliminary Ecological Appraisal (Volume 3)).
Macrophyte	June to September 2024	A single macrophyte survey is to be undertaken in summer over a 100m representative stretch of a freshwater ditch within Area 8 of the Site.
eDNA for freshwater fish	March to May 2024	Two eDNA samples for fish are to be undertaken, one on a freshwater ditch and one on a freshwater pond within Area 8 Site. The samples will be analysed using the metabarcoding technique, to identify the fish species present.
Saltmarsh	June to September 2024	A saltmarsh survey is to be undertaken within Area 8 of the Site which will involve a structured walk and a transect survey. Quadrat surveys will be undertaken in which the vegetation species will be identified and a transect survey will identify the different saltmarsh transitional zones.
Saltmarsh Core Sampling	March to May 2024	Core sampling will be undertaken on a single occasion within the saltmarsh of Area 8 and will help characterise this feature. Fifteen core samples will be taken using a 0.01m ² core sampler.
PSYM (Pond)	June to August 2024	PSYM (Predictive System for Multimetrics) is recommended on one freshwater pond within Area 8 of the Site. This will be surveyed following the standard methodologies.

Survey	Dates	Scope and Method Detail
Marine Habitat	March to May 2024	A marine habitat survey will be conducted to determine habitats and marine plant species present.
Marine Fish	May to June 2024 and September to November 2024	Scientific beam trawls are undertaken at a minimum of three locations within the River Tees in both spring and autumn to adequately characterise the fish composition.
Benthic Ecology and sediments contaminant grab sampling	March 2024	Grab sampling will be undertaken to characterise the marine fauna consisting of six grab samples which will be analysed for benthic infauna and sediment bound contaminants as well as particle size.

ASSESSMENT METHODOLOGY

- 8.4.15. The assessment methodology is common across the Construction and Operation Phase of the Proposed Scheme and will be undertaken in accordance with the CIEEM EcIA guidelines²⁸. These guidelines represent the current best practice for assessing the ecological impact of development projects. Other industry best practice guidance that will be followed when undertaking the assessment is referenced in **Section 8.2**. Each receptor will be evaluated within the geographic scale of reference and against potential impacts from the construction and operation phases of the Proposed Scheme.
- 8.4.16. Consideration will also be given to standard EIA terminology, where the significance level attributed to each effect has been assessed based on the sensitivity of the affected ecological receptors and the magnitude of change arising from the Proposed Scheme, as well as a number of other factors that are outlined (as presented in **Chapter 3: Approach to EIA (Volume 1)**). The sensitivity of the affected receptor is assessed on a scale of very high, high, medium, low, and negligible and the magnitude of change is assessed on a scale of large, medium, small, negligible and no change.
- 8.4.17. This methodology will be used to assess the construction and operational phases of the Proposed Scheme.

SIGNIFICANCE CRITERIA

Magnitude

- 8.4.18. The magnitude relates to the level of change that the receptor will be receiving compared to the baseline conditions, using the duration of the impact, timing, scale, size and frequency to determine the magnitude of the impact to each receptor. Magnitude of impact is evaluated in accordance with the definitions set out in CIEEM EcIA guidelines²⁸ as summarised in **Table 8-4** below.
- 8.4.19. The following characteristics will be used to assess the magnitude of the impact on ecological features as a result of the Proposed Scheme:
- type of impact – beneficial or adverse;
 - extent or spatial scope of the impact;
 - reversibility of impact – whether the impact is naturally reversible or reversible through mitigation measures;

- timing and frequency of the impact, in relation to ecological changes; and
- likely duration of the impact – short term (< 1 year), medium-term (1 – 5 years) or long term (5 or more years).

Table 8-4: Freshwater and Marine Biodiversity Definitions of Impact Magnitude Classes

Magnitude of impact	Definition
High	Total loss or large alteration to key elements/features of the baseline conditions. Results in extensive temporary or permanent changes to baseline conditions such as spawning/nursery/feeding grounds and/or migratory routes.
Medium	Partial loss or alteration to one or more key elements/features of the baseline conditions.
Low	Small shift away from baseline conditions. No noticeable effects above the level of natural variation experienced.
Negligible	Very slight change from baseline conditions.

VALUE AND SENSITIVITY

8.4.20. A number of characteristics contribute to the importance of ecological features. These include, for example (but not exclusively):

- The rarity of a species or habitat;
- Legal protection/conservation status;
- Ability to resist or recover from environmental change;
- Whether the species population size is notable in a wider context including whether there are any keystone species present;
- The richness of assemblages of plants and animals; and
- The presence of species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change.

8.4.21. The CIEEM EclA guidelines²⁸ state that ecological features should be considered within a 'defined geographical context' (i.e. spatial scale), with International importance being the highest level, followed by International and European; National; Regional; Metropolitan, County, vice-county or other local authority-wide areas; River Basin District; Estuarine system/Coastal cell; and Local importance representing the lowest level.

8.4.22. Assigning importance to ecological features is based on professional judgement informed by available guidance and information and expert advice.

8.4.23. **Table 8-5** below summarises the classification of sensitivity of ecological features, based on the CIEEM EclA guidelines²⁸. The level of sensitivity assigned to an IEF is related to its level of importance (on a geographic scale) taking into consideration the various factors listed in **Paragraphs 8.4.20 to 8.4.21**.

Table 8-5: Example Classification of Ecological Features

Importance	Sensitivity	Criteria Examples
International	High	A site forming part of the National Site Network, as designated by the <i>Habitats Regulations</i> (SAC, SPA), or site meeting criteria for international designation.
		A sustainable population of internationally important species (>1% of biogeographic population).
National (England/UK)	High	A nationally designated site (SSSI, National Nature Reserve, Marine Nature Reserve or MCZ), or sites meeting the criteria for national designation.
		Species present in nationally important numbers (>1% of UK population).
		Viable areas of priority habitat listed on Annex I of the Habitats Directive and smaller areas of such habitat that is essential to maintain the viability of that ecological resource.
Regional (north-east)	Medium	Regionally significant and viable areas of key habitat identified as being of regional value.
		Species present in regionally important numbers.
County/Borough (Stockton-on-Tees)	Medium	Local Nature Reserves
		Habitat areas identified as being important at the county scale (for example those identified by the Tees Valley Nature Partnership (related to previous Local Biodiversity Action Plan Habitats). Non-statutory designated sites, e.g. Local

Importance	Sensitivity	Criteria Examples
		Wildlife Sites (LWS) (depending on circumstances).
		Species present in populations considered to be important at the county scale (for example those identified by the Tees Valley Nature Partnership (related to previous Local Biodiversity Action Plan Habitats).
District	Low	Non-statutory designated sites, e.g., Wildlife Sites (LWS) (depending on circumstances).
		Habitats considered to be important at the district level, and populations of a species considered to be important at the district level.
		Species that appreciably enrich the biodiversity resource within the local context; sites supporting populations of county/district important species that are not threatened or rare in the region or county and are not integral to maintaining those populations.
Local (surrounding areas)	Low	Non-statutory designated sites, e.g., Wildlife Sites (LWS) (depending on circumstances).
		Areas of habitat or species considered to appreciably enrich the ecological resource within a local context.
Site	Negligible	Usually widespread and common habitats and species.

SIGNIFICANCE OF EFFECT CRITERIA

8.4.24. The CIEEM EclA guidelines²⁸ define a significant effect in the context of an ecological impact assessment as “an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general”.

Significant effects, as defined by the CIEEM guidelines²⁸, are determined by assessing any deviation in the baseline conditions of a feature of ecological importance that may occur as a result of individual and cumulative impacts during the Construction and Operational Phases of the Proposed Scheme. These effects will be expressed in terms of geographical scale (as outlined in **Table 8-4** above); however, the geographical scale at which an effect is significant can vary from the geographical importance of the ecological feature being assessed. In accordance with the CIEEM guidelines²⁸, this will be a function of the assessment.

- 8.4.25. As set out in **Chapter 3: Approach to EIA (Volume 1)**, effects that are classified as Moderate or Major are considered significant. Effects classified as below Minor or Neutral/Negligible are considered not significant.
- 8.4.26. The overall significance of effect has been assessed using the matrix shown in **Table 8-6** below which has been modified to align with **Chapter 3: Approach to EIA (Volume 1)**.

Table 8-6: Significance of Effects Matrix

Value /Sensitivity	Magnitude of Impacts				
		High	Medium	Low	Negligible
	International	Major	Major to Moderate	Moderate	Negligible
	UK/National	Major	Major to Moderate	Moderate	Negligible
	Regional/ County	Major to Moderate	Moderate	Minor to Moderate	Negligible
	District	Moderate	Minor to Moderate	Minor	Negligible
	Local	Minor	Minor	Negligible	Negligible

8.5. STUDY AREA

- 8.5.1. The Study Area for the Proposed Scheme with regards to marine and freshwater ecology is the area where changes arising from construction and/or operation could affect marine or freshwater ecological receptors. For the purpose of this assessment, it is necessary to apply Study Areas of varying sizes depending on the ecological receptor/feature under assessment; all of which extend beyond the Site. These will hereafter be referred to as 'Zones of Influence' (Zol) for each receptor.
- 8.5.2. The Zol for each receptor have been defined based on current best practice guidelines (CIEEM, 2017³⁵ and 2020³⁶) and currently available project information. In some cases, Zol have been defined on a precautionary basis using professional judgement alongside current guidance and available project information. This is to ensure a sufficient

geographical area has been assessed to allow all reasonably foreseeable impacts to be considered. As the marine and freshwater ecology assessment progresses and further information becomes available, both in terms of survey results and project details/design, the Zol may be subject to refinement later in the project lifecycle.

8.5.3. The Proposed Scheme's freshwater and marine Zol are presented in **Table 8-7**.

Table 8-7: Summary of Zone of Influence for Freshwater and Marine Receptors

Receptor	Zone of Influence (Inclusive of the Site)
Statutory designated sites of international importance*	Within 10km radius from the Proposed Scheme, extended if there is a designated feature(s) that is highly mobile and may be present within the vicinity of the Proposed Scheme.
Statutory designated sites of national importance**	Within 2km of the Proposed Scheme, extended if there is a designated feature(s) that is highly mobile and may be present within the vicinity of the Proposed Scheme.
Non-statutory designated sites***	Within 2km of the Proposed Scheme, extended if there is a designated feature(s) that is highly mobile and may be present within the vicinity of the Proposed Scheme.
Freshwater	
Fish	Within the Site and hydrologically connected watercourses.
Aquatic Macroinvertebrates	Within the Site and hydrologically connected watercourses.
Macrophytes	Within the Site and hydrologically connected watercourses.
Invasive Non-Native Species (INNS)	Within 250m of the Site.
Marine	
Habitats (Subtidal and Intertidal)	Within 250m of the Site.
Benthic Communities	Within 250m of the Site.
Marine Plants and Macroalgae	Within 250m of the Site.
Fish	Within 5km of the Site.
Marine Mammals	Within 5km of the Site or if they are a qualifying feature of a statutory designated site.
INNS	Within 250m of the Site.

* Special Area of Conservation (SAC), SPA and Ramsar site.

** SSSI, Local Nature Reserve (LNR) and National Nature Reserve (NNR)

*** Local Wildlife Sites (LWS)

8.6. BASELINE CONDITIONS AND FUTURE BASELINE

EXISTING BASELINE

- 8.6.1. The baseline conditions for the freshwater and marine ecology assessment are defined through a desk study and a series of field surveys.
- 8.6.2. A summary of the baseline conditions is presented below. As previously described in **Section 8.1**, this assessment does not duplicate information set out in **Chapter 7: Terrestrial Ecology (Volume 1)**.

DESIGNATED SITES

- 8.6.3. Within this Chapter, designated sites have only been considered if they include designated features relating to freshwater and/or marine biodiversity, including aquatic habitats and species.
- 8.6.4. A summary of the designated sites relevant to freshwater and marine biodiversity is provided in **Table 8-8** below.
- 8.6.5. The designated sites described within this section are shown within **Figures 3 and 4 of Appendix 7A: Preliminary Ecological Appraisal (Volume 3)**.

Table 8-8: Designated Sites within the Study Area

Designation	Distance from Site	Summary of designation*
Statutory Designated Sites – International and European (within 10km of the Site)		
Teesmouth and Cleveland Coast Ramsar and SPA	Immediately adjacent	<p>No aquatic features are listed as a Reason for Designation; however, the Site includes aquatic habitats such as intertidal sand, mudflats, rocky shore, saltmarsh, freshwater marsh, and saline lagoons which are of great importance to a diverse assemblage of birds (including designated species).</p> <p>Additionally, pools located in RSPB Saltholme Nature Reserve (part of the Ramsar and SPA) provide habitat for important assemblages of terrestrial invertebrates protected under the Ramsar Convention (Ref 1.11). Further information on these designations and their qualifying features can be found in Chapter 7: Terrestrial Ecology (Volume 1).</p>

Designation	Distance from Site	Summary of designation*
Statutory Designated Sites – National (within 2km of the Site)		
The Teesmouth and Cleveland Coast SSSI	Immediately adjacent to the west.	<p>There are several ‘units’ designated as SSSI surrounding the Site, which each form part of the SPA.</p> <p>The SSSI is of special interest for the following nationally important aquatic features that are present within and are supported by the wider mosaic of coastal and freshwater habitats centred on the Tees Estuary:</p> <ul style="list-style-type: none"> ■ Saltmarshes ■ Breeding harbour seal <i>Phoca vitulina</i>
Teesmouth NNR	1.0km to the north at its nearest point	<p>Teesmouth NNR comprises a range of habitats, including sand dunes, grazing marsh, intertidal sand and mudflats. The area known as Seal Sands is one of the largest areas of intertidal mudflat on the north-east coast.</p> <p>Wildlife interest includes the presence of harbour seals and grey seals <i>Halichoerus grypus</i>. The harbour seals haul out on the sand banks at low tide, and pups are born at the Site each summer. This makes Seal Sands the only regular breeding colony of this species on the north-east coast.</p>
Statutory Designated Sites – Local (within 2km of the Site)		
Berwick Hills LNR	1.7km to the south of Site.	<p>This is designated as a LNR due to the presence of a range of habitats of biodiversity value, including aquatic features such as ponds, reedbeds and running water in the form of Ormsby Beck stream. These aquatic habitats are known to support a range of</p>

Designation	Distance from Site	Summary of designation*
		species, including European eel elvers <i>Anguilla 44uccinel</i> .
Non-statutory Designated Sites (within 2km of the Site)		
Greatham Creek North Bank Saltmarsh LWS	1.8km to the northwest of the Site.	The Site is sandwiched between the mudflats of Greatham Creek and the sea wall with no room for expansion. The vegetation is dominated by saltmarsh grass 44uccinelli asp. With a narrow fringe of glasswort <i>Salicornia</i> sp.
Greenabella Marsh LWS	1.9km to the northwest of the Site.	A large area of rough grassland but with several areas of wetlands, including four pools of open water and several ditches.

* Only aquatic features are included. Please refer to the **Chapter 7: Terrestrial Ecology (Volume 1)** for remaining features.

WFD DESIGNATED WATERBODIES

- 8.6.6. The current Water Framework Directive (WFD) status for the Site was obtained from the EA Catchment Data Explorer website. There is one WFD-designated water body located within the Site, the River Tees Water Body (GB510302509900). The River Tees is tidally influenced, flows into the North Sea approximately 5km downstream of the Proposed Scheme and, borders the Site to the south. The Proposed Scheme will require access to Clarence Wharf on the river and may include the need for improvement works to the wharfs to facilitate the heavy loads. The 2022 WFD ecological status of this water body was classified as Moderate Ecological Status overall. Poor nutrient management, pollution including sewage and heavy metals, and channel modifications are some of many stressors and reasons for the Tees failing to achieve Good overall status. The following biological quality elements are monitored in the Tees: angiosperms (Moderate), saltmarsh sub element (Moderate), fish (Moderate) invertebrates (Good), infaunal quality index sub element (Good), phytoplankton (Good), macroalgae (good) and opportunistic macroalgae sub element (Good).
- 8.6.7. Water resource receptors including the WFD are discussed in more detail in **Chapter 9: Water Environment and Flood Risk (Volume 1)**.

FRESHWATER ECOLOGY

- 8.6.8. An aquatic habitat walkover was undertaken in August 2023 within Area 8 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal (Volume 3)**). Within Area 8 there was a freshwater channel approximately 400m in length and approximately

1.5m in width and a rectangular freshwater pond approximately 55m in length and 30m wide. Within the rest of the Site there was a series of channels approximately 2.5m wide with low levels of water approximately 0.2m in depth with little to no flow. Many of the culverted areas under the tracks were blocked. Other industrial facilities were present in Area 9 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal (Volume 3)**) along Huntsman Drive which revealed rectangular concrete ponds with sloping sides. Details of the habitats and aquatic species in relation to each receptor is presented in the sections below.

- 8.6.9. A desk study using the EA Ecology and Fish Data Explorer was undertaken to determine notable and/or protected freshwater species within the Study Area. The desk study included searches for records of macrophytes, aquatic macroinvertebrates and freshwater fish species.

Macrophytes

- 8.6.10. The desk study did not return any macrophyte data within the Site Boundary of the Proposed Scheme. The nearest EA data sources are approximately 3-8km northwest of the Site and are not hydrologically connected to any watercourses within the Site.
- 8.6.11. A search of the EA Ecology and Fish Data Explorer⁴¹ returned data from surveys undertaken between 2013 and 2016 at Greatham Beck (NGR NZ 48944 27840), Claxton Burn (NGR: NZ 47200 27800), North Burn (NGR NZ 48100 27200) and Cowbridge Beck (NGR NZ 48300 25700). No protected and/or notable species were recorded at any of the locations. The INNS, Himalayan balsam *Impatiens glandulifera* was recorded at Greatham Beck.
- 8.6.12. Macrophytes were noted during the aquatic habitat survey in a pond and ditch within Area 8 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal (Volume 3)**). A full list of the macrophyte species identified during the aquatic habitat survey are presented in **Table 8-9** below. The species list is not exhaustive and serves as an indication of the species present onsite.
- 8.6.13. No protected and/or notable freshwater macrophyte species were recorded at the time of the aquatic habitat survey.

Table 8-9: List of Macrophyte Species Identified on The Site During the Aquatic Habitat Survey

Latin Name	Common Name
<i>Lemna minor</i>	Common duckweed
<i>Epilobium hirsutum</i>	Great willowherb
<i>Potamogeton pectinatus</i>	Sago pondweed
<i>Phragmites australis</i>	Common reed
<i>Veronica beccabunga</i>	European speedwell

Latin Name	Common Name
<i>Rorippa-nasturtium -aquatica</i>	Watercress
<i>Juncus effusus</i>	Common Rush
<i>Agrostis stolonifera</i>	Creeping bentgrass

- 8.6.14. In addition to the freshwater species identified during the aquatic habitat survey, seven saltmarsh species were recorded within Area 8 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal (Volume 3)**). Furthermore, a brackish species of *Bolboschoenus maritimus* sea clubrush was present around the pond (adjacent to railway on the Site Boundary) and in a ditch (mid-point NGR NZ5209723003) on the Site.
- 8.6.15. An area of saltmarsh vegetation was recorded during the habitat survey. It was not considered to meet the criteria for Coastal Saltmarsh HPI, but was indicative of Inland Salt Meadows, which is an Annex I habitat type designated under the Habitats Regulations 2017 (as amended).
- 8.6.16. Further details are provided **Appendix 7C: NVC Report (Volume 3)**.
- 8.6.17. A full list of the saltmarsh and brackish plants identified onsite during the aquatic habitat survey are presented in **Table 8-10** below. The species list is not exhaustive and serves as an indication of the species present onsite.

Table 8-10: List of Saltmarsh Plant Species Identified During Aquatic Habitat Survey

Latin Name	Common Name
<i>Bolboschoenus maritimus</i>	Sea clubrush
<i>Atriplex prostrata</i>	Spear-leaved orache
<i>Salicornia europaea agg.</i>	Marsh samphire
<i>Suaeda maritima</i>	Herbaceous seepweed
<i>Aster tripolium</i>	Saltmarsh-grass
<i>Juncus gerardii</i>	Saltmarsh rush
<i>Puccinellia distans</i>	Weeping alkaligrass
<i>Spergularia marina</i>	Salt sandspurry

- 8.6.18. No protected and/or notable brackish macrophyte species were recorded at the time of the aquatic habitat survey.

Aquatic Macroinvertebrates

- 8.6.19. The desk study did not return any aquatic macroinvertebrate data within the Application Site for the Proposed Scheme. Additionally, there are no EA records of

macroinvertebrate data on the main freshwater watercourse Holme Fleet that is adjacent to the Site. The nearest EA sampling locations where data was available are approximately 5-9km from the Site and are not hydrologically connected to any watercourses within the Site.

- 8.6.20. A search of the EA Ecology and Fish Data Explorer⁴¹ returned data from monitoring locations which included:
- Claxton Burn (NGR NZ 46885 27771) approximately 8km from the Site. In 2019, one nationally scarce stonefly species *Capnia atra* was recorded.
 - Cowbridge Beck (NGR NZ 47901 25744) approximately 5.5km to the north west of Site. In 2018, no protected and/or notable species were recorded but one INNS mollusc, the New Zealand mud snail *Potamopyrgus antipodarum* was. However, it must be noted that this species is widespread throughout the UK and is considered naturalised.
 - Billingham Beck (NGR NZ 43707 23478) approximately 9km to the west of the Site. In 2018, no protected and/or notable species were recorded but two INNS species, the signal crayfish *Pacifastacus leniusculus* and an amphipod *Crangonyx pseudogracilis/floridanus* were recorded. However, it must be noted that the latter is widespread throughout the UK and considered naturalised.
- 8.6.21. No records of white-clawed crayfish *Austropotamobius pallipes* were returned in the desk study data.
- 8.6.22. Suitable habitat was observed for aquatic macroinvertebrates within a freshwater ditch and freshwater pond within Area 8 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal (Volume 3)**) during the aquatic habitat survey.
- 8.6.23. The habitat conditions in the freshwater ditch and pond were deemed sub optimal for white-clawed crayfish. The banks of the ditch were unsuitable for burrowing; the water was shallow with very little flow and leachate from slag used on the banks means the water to be saline in places. Furthermore, the water source for the ditch is connected to the River Tees and if it backs up at high tide there would be an inundation of saline water to the ditch which would be unsuitable conditions for this species. Furthermore, the pond was concrete lined and as such unsuitable for this species.

Freshwater Fish

- 8.6.24. The desk study did not return any freshwater fish data within the Site Boundary of the Proposed Scheme. A search of the EA's Ecology and Fish Data Explorer⁴¹ returned data from two locations within the River Tees, Warm Up Pool and Canoe Slalom. Both of these monitoring locations are approximately 6km directly upstream of the Site on the River Tees.
- 8.6.25. Data was returned from an EA fish survey from Warm Up Pool (NGR NZ 46177 19106, NZ 461431 19088). The species returned in the desk study for this location are presented in **Table 8-11** below. Only the most recent data (2016-2019) were considered, as they are the most representative of likely current conditions and also provides context on what species may be present within the River Tees.

Table 8-11: Environment Agency Fish Data from Warm Up Pool

Common Name	Latin Name	2016	2017	2018	2019
Roach	<i>Rutilus rutilus</i>	151	23	156	144
Dace	<i>Leuciscus leuciscus</i>	46	3	69	-
Common bream	<i>Abramis brama</i>	13	-	21	11
Chub	<i>Leuciscus cephalus</i>	18	1	-	-
Perch	<i>Perca fluviatilis</i>	5	2	25	21
Gudgeon	<i>Gobio gobio</i>	6	-	2	
Brown/sea trout	<i>Salmo trutta</i>	1	-	-	-
Flounder	<i>Platichthys flesus</i>	6	-	2	-
Pike	<i>Esox lucius</i>	1	-	-	-
European eels > elvers	<i>Anguilla anguilla</i>	-	-	2	1
Roach x common bream hybrid	<i>Rutilus rutilus x Abramis brama</i>	-	-	1	-

8.6.26. A further search of the EA Ecology and Fish Data Explorer⁴¹ returned data from an EA fish survey at Canoe Slalom (NGR NZ 46377 19170). The species returned in the desk study for this location are presented in **Table 8-12** below. Only the most recent data (2016-2017) was considered, as this is the most temporally relevant and also provides context on what species may be present within the River Tees.

Table 8-12: Environment Agency Data from Canoe Slalom

Common Name	Latin Name	2016	2017
Roach	<i>Rutilus rutilus</i>	1	-
Dace	<i>Leuciscus leuciscus</i>	6	-

Common Name	Latin Name	2016	2017
Atlantic Salmon	<i>Salmo salar</i>	10	-
Brown/Sea Trout	<i>Salmo trutta</i>	6	2

Notable Species

- 8.6.27. Several notable freshwater fish species were identified within the desk study data including European eels, Atlantic salmon, and brown/sea trout. These species are listed as SPI in accordance with Section 41 of the NERC Act 2006. Public bodies have an obligation under Section 40 to have regard for these species when carrying out their functions.
- 8.6.28. Additionally, Atlantic salmon were noted at the EA Canoe Slalom monitoring location on the River Tees which is approximately 6km upstream of the Site. This species migrates from marine to freshwater to spawn so this species will migrate through the Site to access the sea.
- 8.6.29. Furthermore, European eel are also listed as critically endangered on the Global International Union for Conservation of Nature (IUCN) Red List, recognised as the most authoritative guide to the status of biological diversity⁴⁴. In addition to this, European eels are protected under The Eels (England and Wales) Regulations 2009²².

Habitat

- 8.6.30. Suitable habitat for freshwater fish was noted during the habitat survey in a freshwater ditch and freshwater pond within Area 8 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal Report (Volume 3)**). Sticklebacks (Gasterosteidae) were observed in the freshwater ditch during the aquatic habitat survey, though the species was not determined.

MARINE ECOLOGY

- 8.6.31. An aquatic habitat survey was undertaken along the river Tees within Area 1, 2 and 3 of the Site (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal Report (Volume 3)**) in August 2023. The southern border of the Proposed Scheme is adjacent to the Tidal section of the River Tees. This stretch of the Tees was approximately 300m wide and is influenced both fluvially and tidally. The left bankside had a mixture of bank modifications including sections of rip rap, sheet piling and concrete structures. The right bank was dominated by an industrial landscape and similar bank modifications. A flood wall was present within Area 1 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal Report (Volume 3)**) which had an area of scrub and tall herbs between it and the river. Additionally, an earth embankment was present, acting as a flood defence, this was covered with a variety of terrestrial plants and a solitary Japanese rose *Rosa rugosa*.
- 8.6.32. Area 11 and 12 (shown in **Figure 2 of Appendix 7A: Preliminary Ecological Appraisal Report (Volume 3)**) consisted of predominantly rip rap with driftwood and

litter. An outfall was situated within this area discharging water from one of the concrete holding ponds.

Abiotic Conditions

- 8.6.33. Water temperature, salinity and turbidity data were acquired from EA WIMS database at Tees at Smiths Dock monitoring station (within the Study Area and directly adjacent to the Site⁴²). The water temperature in this section of the Tees ranged between 6.60°C (February 2023) and 16.20°C (September 2022), with a salinity ranging between 19.85 parts per thousand (ppt) (January 2023) and 30.90 ppt (August 2022). Turbidity within this section of the Tees ranged from 2.90 formazin turbidity units (ftu) (August 2022) and 19.60 ftu (January 2023).

Benthic Habitats and Associated Communities

Benthic Habitats

- 8.6.34. The predominant intertidal substrate type within the Tees Estuary, is mud and sand, with some localised areas of gravel. Additionally, there are areas of intertidal substrate described as 'Man Made'. This section of the Tees Estuary is heavily modified, with both banks consisting of wharfs, sheet piled walls and embankments as a result of historical industrial activity. Multiple anthropogenic features including flood defences have restricted the High-Water mark. Consequently, there is permanent inundation of most intertidal areas along the estuary. This has made the remaining intertidal zone very narrow and steep in profile⁴³.
- 8.6.35. One Priority Habitat is present within the Study Area, namely intertidal mudflats. Intertidal mudflats are a UK Biodiversity Action Plan (UKBAP) priority habitat, legally protected as a Habitat of Principal Importance (HPI) under Section 41 of the NERC Act. This habitat type is also listed in the OSPAR Convention as a threatened and/or declining habitat in Region II (the Great North Sea). There is mudflat habitat present within the Study Area, equating to a total area of approximately 21.08 ha. These areas of mudflat habitat are also classified as a WFD Lower Sensitivity Habitat (Intertidal Soft Sediment – Sand, Mud & Mixed A2.2, A2.3, A2.4).
- 8.6.36. Coastal saltmarsh is present within the Tees Estuary. The closest recorded location to the Proposed Scheme is at the confluence of the River Tees and Grantham Creek, approximately 3.5km downstream from the westward extent of the Site. Coastal Saltmarsh is a UKBAP Priority Habitat and HPI, WFD Higher Sensitivity Habitat, and listed as a threatened and/or declining habitat under the OSPAR Convention (Region II). Saltmarsh is also a Reason for Notification for The Teesmouth and Cleveland Coast SSSI as a nationally important feature.
- 8.6.37. The subtidal substrate present within the Study Area entirely consists of sand and mud. This is not classified as an HPI, however, it is a WFD Lower Sensitivity Habitat (Subtidal Soft Sediment – Sand, Mud & Mixed A5.2, A5.3, A5.4).
- 8.6.38. Contaminant analysis was undertaken on sediment samples collected as part of The Net Zero Teesside project. The samples were collected approximately 4 – 8km downstream of the Proposed Scheme, in Bran Sands, South Gare and Coatham Sands. The findings from these samples indicated that despite the industrialised nature of the

surrounding area, there is no evidence of contaminant levels which would be expected to cause harm to benthic habitats and species⁴⁵.

Benthic Communities

- 8.6.39. The benthic invertebrate community was recorded at an EA Transitional Coastal (TraC) monitoring location (NGR NZ 54446 26476), approximately 3.3km downstream from the Study Area. Grab samples were collected from multiple depths (5 – 15m), with the most recent sample collected in 2016⁴¹.
- 8.6.40. The assemblage of benthic invertebrates identified in the grab samples was dominated by polychaetes, notably *Ophryotrocha* sp., *Euchone* sp., and *Manayunkia aestuarina*, which are typical of brackish waters. The marine mudsnail *Peringia ulvae* and sludgeworms *Tubificoides benedii* were also present in high abundance. Species of roundworms (nematoda), crustaceans, echinoderms, flatworms (turbellaria), ribbon worms (nemertea), cnidarians, mites (acari), springtails (collembola), horseshoe worms (phoronida) and tunicates were also recorded.
- 8.6.41. No protected or notable species were recorded within the grab samples. One INNS was observed in 2016, a bivalve known as the false anglewing or American piddock, *Petricolaria pholadiformis*. This species is a mechanical borer into hard clay, solid mud and limestone from the mid-tide level to low water. Whilst not recorded in 2016, the gammarid *Monocorophium acherusicum* was detected at the Site in 2013. The INNS soft-shell clam *Mya arenaria* has also been recorded in the Tees Estuary in 2010 (NGR NZ 48419 22082⁴¹); this species is believed to be non-native, however is now widespread and considered naturalised within the UK.

Phytoplankton

- 8.6.42. Phytoplankton is regularly monitored in the Tees Estuary by the EA, with two monitoring sites located within the Study Area (NGR NZ 52800 22100 and NZ 49900 21300). The EA collects monthly samples from these locations (with some exceptions Jan – April 2019; April – September 2020).
- 8.6.43. The most abundant phytoplankton taxa were diatoms, with euglenophytes, cyanobacteria and microflagellates also found in high abundance. This composition is typical of phytoplankton communities in UK estuaries. Greatest abundance typically occurs between May and August, peaking in June, with lower abundance observed in winter months (November to January).
- 8.6.44. No protected or invasive taxa were identified during EA surveys (2015-2023), however taxa known to cause harmful algal blooms in the UK coastal waters were present. These include *Alexandrium* spp., *Dinophysis acuminata*, *D. acuta* and *Pseudo-nitzschia* spp. Additionally, several taxa known to cause fish mortality were also recorded. These include *Gymnodinium* spp., *Dictyocha speculum*, and *Chaetoceros* spp.^{46 47}

Marine Plants and Macroalgae

- 8.6.45. Data regarding marine plants and macroalgae in the Study Area are limited. However, following intertidal and subtidal surveys conducted as part of The Net Zero Teesside Project, the surveyed section of the Tees Estuary was determined to have low abundance and diversity of macroalgae⁴⁵. In these surveys, sea lettuce *Ulva* sp., purple

laver *Porphyra umbilicalis*, and fucoids (serrated wrack *Fucus serratus*, horned wrack *Fucus ceranoides* and bladderwrack *Fucus vesiculosus*) were observed. Additionally, one invasive species of intertidal kelp, wakame *Undaria pinnatifida*, was also recorded.

- 8.6.46. Native seagrass, which is predominantly comprised of common eelgrass *Zostera marina*, is also present in the Tees Estuary. Whilst a large amount of this habitat has been lost, restoration projects are being undertaken, including at North Gare, approximately 5km downstream of the Proposed Scheme⁴⁸.
- 8.6.47. During the aquatic habitat survey *Fucus* sp. was identified on the rip rap along the River Tees. No protected and/or notable marine macrophyte or macroalgae species were recorded at the time of the aquatic habitat survey.

Marine Fish

- 8.6.48. Estuarine and marine fish assemblage within the Tees estuary consist of demersal and pelagic species typical of the North Sea. Data from an EA monitoring site located approximately 4km downstream from the Proposed Scheme (NGR NZ 53946 26617) is presented in **Table 8-13**. Only the most recent data (2016-2018) was considered, as this is the most temporally relevant. This data also provides context on what species may be present within the Tees estuary.

Table 8-13: Environment Agency Fish Data, North Gare Sands, Tees Estuary

Common Name	Latin Name	2016	2017	2018
Herring*†	<i>Clupea harengus</i>	29	10	564
Plaice*†	<i>Pleuronectes platessa</i>	16	12	9
Lesser sandeel	<i>Ammodytes tobianus</i>	1	373	17
Flounder†	<i>Platichthys flesus</i>	2	21	-
Sprat†	<i>Sprattus sprattus</i>	276	7	-
Sand goby	<i>Pomatoschistus minutus</i>	3	1	-
Dab	<i>Limanda limanda</i>	1	1	-
Three-spined stickleback	<i>Gasterosteus aculeatus</i>	-	-	-
Five-bearded rockling	<i>Ciliata mustela</i>	-	-	-

*Species of Conservation Interest

†Commercially targeted species

- 8.6.49. The EA also undertakes fish surveys at the Tees barrage (NGR NZ 46789 19328 and NZ 46789 19328), which is located approximately 5km upstream of the Site. The assemblage was similar to that at North Gare Sand (**Table 8-14**). However, the barrage

is where the River Tees transitions into a freshwater environment, and therefore the fish assemblage will likely become increasingly dominated by freshwater species at sites upstream of the barrage. Even though this data is 8 years old, it still provides context on what fish species may be present within the Tees estuary.

Table 8-14: Environment Agency Fish Data, Tees Barrage, 2015

Common Name	Latin Name	Sample A (NZ 46789 19328)	Sample B (NZ 46789 19328)
Plaice*†	<i>Leuronectes platessa</i>	3	157
Sprat†	<i>Sprattus sprattus</i>	2	3
Dab	<i>Limanda limanda</i>	3	2
Dover sole†	<i>Solea solea</i>	1	-
Sand goby	<i>Pomatoschistus minutus</i>	3	5
Whiting†	<i>Merlangius merlangus</i>	-	1
Flounder†	<i>Platichthys flesus</i>	78	29
Common goby	<i>Pomatoschistus microps</i>	37	8
Brown/sea trout*	<i>Salmo trutta</i>	1	-
Herring*†	<i>Clupea harengus</i>	258	27

*Species of Conservation Interest

†Commercially targeted species

8.6.50. Fisheries sensitivity maps⁵¹ indicate the Tees Estuary provides nursing grounds for several marine species. This includes herring, plaice, whiting (high intensity); and cod, dover sole, anglerfish and spiny dogfish (low intensity). Therefore, juveniles of these species could potentially be present within the estuary which flows through the Site. The conservation status of these notable species is detailed in **Table 8-15**.

Table 8-15: Summary of Fish Species of Conservation Interest Listed Under National or International Legislation/Policy Present Within the Tee Estuary

Common Name	Latin Name	Habitats Directive (Annex)	OSPAR threatened and/or declining species	Bern Convention (Appendix)	Bonn Convention (Appendix)	NERC 2006 Species of Principal Importance	IUCN Red List*
Herring	<i>Clupea harengus</i>					Yes	LC
Plaice	<i>Pleuronectes platessa</i>					Yes	LC
Cod	<i>Gadus morhua</i>		Yes			Yes	LC
Whiting	<i>Merlangius merlangius</i>					Yes	LC
Dover sole	<i>Solea solea</i>					Yes	LC
Anglerfish	<i>Lophius piscatorius</i>					Yes	LC
Spurdog/ Spiny dogfish	<i>Squalus acanthias</i>		Yes		II	Yes	EN

Common Name	Latin Name	Habitats Directive (Annex)	OSPAR threatened and/or declining species	Bern Convention (Appendix)	Bonn Convention (Appendix)	NERC 2006 Species of Principal Importance	IUCN Red List*
Atlantic salmon	<i>Salmo salar</i>	II, V	Yes			Yes	VU
Brown/Sea trout	<i>Salmo trutta</i>					Yes	LC
European eel	<i>Anguilla anguilla</i>		Yes			Yes	CR
Sea lamprey	<i>Petromyzon marinus</i>	II	Yes	III		Yes	LC
River lamprey	<i>Lampetra fluviatilis</i>	II, V		III		Yes	LC

* IUCN Red List of Threatened Species. European classification: LC = Least Concern, VU = Vulnerable, EN = Endangered, CR = Critically Endangered

Shellfish

- 8.6.51. Common shellfish species are present within the inshore waters. Shellfish surveys conducted on inshore waters as part of the Dogger Bank Teesside Project and Teesside Offshore Wind Project (approximately 8 – 12km from the Site) recorded edible crab *cancer pagurus*, harbour crab *Liocarcinus depurator*, European lobster *Homarus Gammarus* and velvet swimming crab *Necora puber* surveys in high abundance^{52 53}. However, there are no designated shellfish waters within the vicinity of the Site.

Diadromous Fish

- 8.6.52. The River Tees and estuary is an important water body for diadromous fish species that make seasonal migrations between freshwater and marine environments. Atlantic salmon, brown/sea trout, European eel, river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* are known to be present and identified as Local Priority Species within the Tees Valley BAP⁴⁹. The conservation status of these notable species is detailed in **Table 8-15** above.

Marine mammals

- 8.6.53. Within the Greater North Sea Ecoregion, in which the Proposed Scheme is located, four species of cetaceans occur commonly or are resident: harbour porpoise *Phocoena phocoena*, minke whale *Balaenoptera acutorostrata*, bottlenose dolphin *Tursiops truncatus* and white-beaked dolphin *Lagenorhynchus albirostris*. Five more species occur less commonly: Atlantic white-sided dolphin *L. acutus*, orca *Orcinus orca* (killer whale), long-finned pilot whale *Globicephala melas*, Risso's dolphin *Grampus griseus* and short-beaked common dolphin *Delphinus delphis*⁵⁴.
- 8.6.54. The abundance and density of cetaceans within the Tees Estuary/River Tees (and therefore immediate vicinity of the Proposed Scheme) is anticipated to be low due to the high levels of disturbance caused by vessel traffic. However, due to the highly mobile and transient nature of cetaceans, individuals could be present within the Study Area.
- 8.6.55. Of the species likely present within the Study Area, harbour porpoise are the most likely species to be present within the vicinity of the Site. This is due to the lack of suitable habitat available for other cetacean species. The protective status of the harbour porpoise is detailed in **Table 8-16**.
- 8.6.56. There are two pinniped species within the Tees Estuary, the grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina*.
- 8.6.57. A small population of resident harbour seals are present within the River Tees, and haul out at Seal Sands and Greatham Creek, approximately 4.5km from the Study Area. Harbour seals also use the Tees estuary as a breeding site, with breeding harbour seals listed as a Reason for Notification for The Teesmouth and Cleveland Coast SSSI.
- 8.6.58. There are no reported breeding sites for grey seals in the Tees Estuary, however this species also hauls out at Seal Sands⁵⁵.
- 8.6.59. Both species are protected under the Conservation of Seals Act 1970. Further protection status of the two seal species is detailed in **Table 8-16**.

Table 8-16: Summary of Marine Mammal Species of Conservation Status Listed Under National or International Legislation/Policy

Common Name	Latin Name	WCA	EC Habitats Directive (Annex)	Bern Convention (Appendix)	Bonn Convention (Appendix)*	OSPAR threatened and/or declining species	ASCOBANS
Harbour porpoise	<i>Phocena phocena</i>	Yes	II, IV	II	II	Yes	Yes
Harbour seal	<i>Phoca vitulina</i>	Yes	II, V	III			
Grey seal	<i>Halichoerus grypus</i>	Yes	II, V	III			

* North and Baltic Sea, western North Atlantic, Black Sea and North West African populations

FUTURE BASELINE

Overview

- 8.6.60. Climate change is a key factor when attempting to predict the future baseline of an ecosystem or species community. Climate change is projected to lead to warmer, wetter winters and hotter, drier summers, with an increase in the intensity and frequency of extreme events such as heatwaves, drought, extreme rainfall leading to flash flooding, storms, wind events, changes in sea level and changes to erosion and deposition patterns. Further information is provided in **Chapter 9: Water Environment and Flood Risk (Volume 1)** and **Chapter 12: Climate Change Resilience (Volume 1)**.
- 8.6.61. Impacts of climate change on species are considered to include changes in distribution and abundance, the timing of seasonal events and habitat use and, as a consequence, there are likely to be changes in the composition of plant and animal communities. Habitats and ecosystems are also likely to change in character. Further information is presented below which illustrates how changes within the climate may impact upon freshwater and marine receptors.
- 8.6.62. Area 8 is understood to be subject to an extant planning permission held by the current landowner. If the proposals for which planning permission has been granted are implemented, this will result in the loss of saltmarsh and reedbed habitat within the Site and as such a change in the baseline conditions in this area.

Freshwater Habitats and Species

Macrophytes

- 8.6.63. Climate change resulting in drought, flooding, pollution and subsequent changes in land management has the potential to impact on macrophytes species occurring in freshwater habitats. Changes in species composition, abundance and distribution, as well as loss of aquatic plants would also impact on invertebrates and animals higher up the food chain that depend on them.

Aquatic Macroinvertebrates

- 8.6.64. Similarly for freshwater invertebrates, climate change effects have the potential to adversely affect invertebrates with changes in community composition, abundance and distribution and especially for those that are sensitive to drying.

Freshwater Fish

- 8.6.65. Higher water temperatures and drought are main stressors on freshwater fish. Increased temperature reduces the maximum concentration of dissolved oxygen in the water as well as increasing biological and chemical oxygen demand, and fish respiration. This may result in physiological and behavioural changes, as well as changes in species distribution. Such reductions in water quality may also lead to a decline in invertebrates and reduce the main food source of many fish species. Furthermore, drought and consequently low water flow may impede migration for both diadromous fish and seasonal migrant fish species.

Marine habitat and species

Benthic Habitat

- 8.6.66. Coastal squeeze (barrier to natural habitats migrating landward in response to sea level rising) may cause the loss of intertidal habitats, such as saltmarsh and intertidal mudflat, which will have an impact on the associated intertidal species due to reduced or loss of habitat.

Benthic Communities (subtidal and intertidal)

- 8.6.67. Rising sea levels and increasing water temperatures may result in a species regime shift due to northward range expansion of 'southern species' and a retreat of 'northern species'. Increased water temperatures may also result in increased habitat viability for INNS, which may cause the degradation or loss of native benthic species. Rising sea levels may also result in an increase in the habitat available for subtidal species and a reduction for intertidal adapted species. Another consequence of climate change is ocean acidification which may impact upon marine invertebrates and zooplankton, especially those with calcareous exoskeletons.

Marine Plants and Macroalgae

- 8.6.68. Rising sea level and coastal squeeze have the potential to result in reduced habitat viability for saltmarsh species due to increased immersion times and increased water depths. Sea level rise may also increase the amount of habitat available for intertidal algal species and may result in increased colonisation of the river wall.

Phytoplankton

- 8.6.69. Drought, flooding, pollution and subsequent changes in land management has the potential to impact on phytoplankton. Furthermore, rising water temperatures may provide more suitable habitat conditions for invasive phytoplankton species and potentially lead to more frequent algal blooms. Changes in species composition, abundance and distribution may also impact animals higher up the food chain that depend on them such as zooplankton and fish species.

Marine Fish

- 8.6.70. Rising sea levels and increasing water temperatures may result in a regime shift due to northward range expansion of 'southern species' and a retreat of 'northern species'. Alterations to habitat types, including coastal squeeze may also result in changes in fish community composition. Changes to the plankton community may also drive changes in fish distribution.

Marine Mammals

- 8.6.71. Changes to the benthic communities and fish caused by rising sea level and increased water temperatures may have indirect impacts upon marine mammals through changes in prey availability and the subsequent distribution of marine mammals.

Invasive Non-Native Species

- 8.6.72. The effects of climate change, including rising sea levels and increasing water temperatures, may facilitate the spread and establishment of INNS through increased habitat viability and reduced competition/predation.

Land Use Changes

- 8.6.73. The area of the former reclamation pond, part of the SAF Plant Site, is understood to be subject to an extant planning permission held by the current landowner. If the proposals for which planning permission has been granted are implemented (comprising infilling of the land to create a development platform), this will result in the loss of Open Mosaic Habitat on Previously Developed Land (OMHPDL), saltmarsh and reedbed habitat within the Site. It is understood that any infilling works will be undertaken prior to the Proposed Scheme and are being undertaken regardless of the Proposed Scheme outcomes.
- 8.6.74. The basis of assessment for this PEIR is that these habitats form part of the current baseline for the Site. However, for the ES, there are two potential scenarios with regard to the habitat baseline and subsequent assessment, given that the extant permission could be implemented and these habitats removed within the DCO application timescales (see **Chapter 2: Site and Proposed Scheme Description (Volume 1)**). If infilling works have been completed prior to the construction of the Proposed Scheme, the land may be used as a Construction Laydown Area(s), however if it has not been infilled, the Proposed Scheme will use an alternative laydown area.

8.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

OVERVIEW

- 8.7.1. The design of the Proposed Scheme is an iterative process and subject to revision and refinement throughout preparation of this PEIR and the subsequent ES. However, as stated in **Chapter 3: Approach to EIA (Volume 1)**, embedded mitigation will be included as part of the design.
- 8.7.2. The design process has, and will continue to, include consideration of aquatic ecological receptors and incorporate measures to avoid and reduce the potential for adverse impacts.
- 8.7.3. As a general principle, the mitigation hierarchy will be adhered to as far as possible. Avoidance (in the first instance) and mitigation measures will be developed throughout the design process of the Proposed Scheme to avoid and reduce the potential for adverse effects. It is envisaged that, where possible, any habitats of biodiversity value will be retained as part of the Proposed Scheme, with enhancement measures provided alongside these. Where this is not possible, compensation measures will be explored.
- 8.7.4. The following represent key principles that will, wherever possible, be enforced during the design of the Proposed Scheme.

CONSTRUCTION PHASE

- A minimised construction footprint should be considered through the selection of options which require less intrusion into the marine and freshwater environments reducing and/or avoiding potential habitat loss. This includes the proposed improvement works to Clarence Wharf.
- Measures intended to avoid or reduce air and water emission impacts are expected to be embedded into the design of the Proposed Scheme. Area 8 will be subject to an environmental permit which would strictly regulate air and water emissions. Further details are provided in **Chapter 5: Air Quality (Volume 1)** and **Chapter 9: Water Environment and Flood Risk (Volume 1)**. The Proposed Scheme will also include its own wastewater treatment facilities to clean (and reuse as far as practicable) process water, with effluent being discharged to the nearby Bran Sands WWTP.
- A Code of Construction Practice (CoCP), bespoke to the Proposed Scheme, will be produced to cover works during the construction phase and an Outline CoCP (OCoCP) will be submitted as part of the DCO application. The OCoCP will detail best practice mitigation measures to be incorporated into the Proposed Scheme during the Construction Phase. Such measures will include:
 - The construction programme being kept to the minimum amount of time needed to complete the works, in order to minimise the temporal extent of disturbance to ecological receptors;
 - Soft-start techniques for plant and equipment to minimise loud, percussive noises most disturbing to fish species, to be secured via a Noise

Management Plan (NMP; further details are provided in **Chapter 6: Noise and Vibration (Volume 1)**;

- General employment of noise reduction measures on operational plant machinery and equipment, to be secured via a Noise and Vibration Plan (NVP);
 - Dust suppression measures, to be secured via a Dust Management Plan (DMP) (further details are provided in **Chapter 5: Air Quality (Volume 1)**);
 - Best practice measures for pollution prevention to minimise impacts on surrounding habitats (including water quality), such as the creation of suitable of drainage and use of silt fences, where necessary; and
 - Use of sensitive lighting where any night works are required.
- Robust measures and equipment for dealing with any unexpected pollution events will be in place at all times.
 - All construction materials used will be safe for use in the freshwater and marine environment.
 - Any construction activity that may cause direct disturbance to the freshwater and marine environment (such as piling) should not commence unless an Ecological Clerk of Works (ECoW) is present. This is to ensure sensitive species, notably marine mammals, are absent from the area.
 - Construction activities such as piling should occur outside of sensitive periods for fish species identified within this Chapter. This includes migration, spawning and nursery periods. The most appropriate timing will be agreed with the regulatory bodies.
 - Where possible, migration routes for fish will be maintained during the construction phase and where appropriate fish will be translocated during construction activities, particularly in advance of dewatering if this is required.
 - Construction vessel speeds will be moderated by following standard operating procedures. Where practicable, there will be an implementation of reduced vessel speeds in proximity of Clarence Wharf to reduce potential for vessel strike with marine mammals and to reduce the risk of any potential damage to intertidal habitats from wave wash.
 - It is expected that construction vessels will follow standard procedures for managing INNS in their ballast water. As part of the OCoCP, a Biosecurity Management Plan will be developed and implemented with standard biosecurity measures, in line with best practice UK guidance and will be discussed in liaison with the EA, NE, the PLA and the MMO, as appropriate. This will promote the effective cleaning of all marine equipment and infrastructure (if, utilised in other waterbodies), along with preventing the release of any subsequent waste arisings back into the marine environment. Relevant guidance such as the Check, Clean, Dry campaign led by the GB Non-native Species Secretariat will also be followed. Provision of local materials will be used where practicable, and materials should be appropriately treated to minimise the potential spread of INNS.

- All construction vessels will act in accordance with their own management/accident plans, as well as those of the Port of Tees Authority/Maritime Coastal Agency, thus limiting the potential for accidental fuel leaks.
- Upgrade to Clarence Wharf and excavation activities in the intertidal zone, involving potential excavation work should, where practicable, occur during low tide conditions to minimise the dispersion of suspended sediment.
- Workers should be equipped with the necessary equipment, Personal Protective Equipment (PPE) and substances to implement biosecurity control measures, including effective hygiene and sanitation practices. This will most frequently comprise disinfectant tablets, sprayers, and brushes to clean and disinfect equipment and PPE prior to entering/leaving construction areas.
- Construction materials should be securely stored and maintained away from watercourses. Silt fences or similar should be placed around exposed ground and stockpiles, and early revegetation of the completed elements of the construction area should be undertaken to reduce further erosion.

8.7.5. An INNS Management Plan will be prepared to prevent the spread of INNS identified through desk study and future surveys within the Proposed Scheme.

8.7.6. Specific operational impacts for the Proposed Scheme will be identified and presented in the completed Freshwater and Marine assessment as part of the ES as the design scheme progresses.

OPERATION PHASE

8.7.7. Mitigation measures during the Operation Phase are likely to include:

- Appropriate design of the Proposed Scheme to minimise air quality and noise impacts on surrounding habitats, including statutory designated sites;
- Appropriate design of the Proposed Scheme to minimise water quality impacts on surrounding habitats, including waterbodies and the River Tees; and
- A sensitive lighting scheme for any permanent lighting to be installed as part of the Proposed Scheme.
- Operational vessel speeds will be moderated by following standard operating procedures. Where practicable, there should be reduced vessel speeds in proximity of Clarence Wharf to reduce potential for vessel strike with marine mammals and to reduce the risk of any potential damage to intertidal habitats from wave wash.
- All operational vessels will act in accordance with their own management/accident plans, as well as those of the Port of Tees Authority/Maritime Coastal Agency, thus limiting the potential for accidental fuel leaks.
- It is expected that vessels will follow standard procedures for managing INNS on hulls and in their ballast water. A Biosecurity Management Plan will be developed as part of the OCoCP and implemented with standard biosecurity measures, in line with best practice UK guidance. This will promote the effective cleaning of all marine equipment and infrastructure (if, utilised in other waterbodies), along with

preventing the release of any subsequent waste arisings back into the marine environment. Relevant guidance such as the Check, Clean, Dry campaign led by the GB Non-native Species Secretariat will also be followed. The supply route of vessels, equipment and infrastructure in the Study Area will be determined as part of subsequent work in the ES.

- 8.7.8. Specific operational impacts for the Proposed Scheme will be identified and presented in the completed Freshwater and Marine assessment as part of the ES as the design scheme progresses.

8.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

OVERVIEW

- 8.8.1. This assessment is based upon the current design parameters of the Proposed Scheme and may be subject to change following the final design details being fully determined. As such, the preliminary assessment provided below has been carried out based on the information at the time of writing and is considered indicative and elements of the assessment are yet to be completed. A full impact assessment will be provided in the ES.
- 8.8.2. An assessment of likely impacts and effects during both the construction and operation phases based on currently available information and without considering mitigation is provided below.

CONSTRUCTION PHASE

- 8.8.3. **Table 8-17** below, provides a summary of potential likely significant effects identified at this stage for the construction of the Proposed Scheme in the absence of mitigation.

Table 8-17: Summary of Potential Likely Impacts and Effects During Construction Phase

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
Teesmouth and Cleveland SPA and Ramsar	High	The SPA and Ramsar has no aquatic habitats or species which are a qualifying feature or Reason for Designation. Therefore, they are not considered further in this assessment. Further details on the impacts to IEF at these designated sites can be found in Chapter 7: Terrestrial Ecology (Volume 1) .	N/A	N/A
Teesmouth and Cleveland Coast SSSI	High	<p>Noise and vibration, artificial lighting, and visual disturbance to harbour seals and their breeding locations in the SSSI.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) during improvement works to existing wharfs and increased navigation in the Tees Estuary (resulting in wave wash disturbing sediment).</p> <p>Increased pollution risk from spillages and dust deposition which result in habitat disturbance/degradation and long-term loss of suitable habitat for the qualifying features (saltmarsh and harbour seals).</p>	Medium	Major Adverse to Moderate Adverse (Significant)

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
Teesmouth NNR	High	Due to its distance from the Site, direct impacts, and the majority of indirect impacts to the Teesmouth NNR are expected to be avoided. However, there may be indirect impacts on grey seals and harbour seals, which are an important mobile feature of the Teesmouth NNR.	Low	Moderate Adverse (significant)
Berwick Hills LNR	Medium	Due to its distance from the Site and lack of hydrological connectivity to the Site, impacts to Berwick Hills LNR are expected to be avoided. Air quality impacts will be discussed in Chapter 5: Air Quality (Volume 1) .	Negligible	Negligible (Not Significant)
Greatham Creek North Bank Saltmarsh LWS and Greenabella Marsh LWS	Low	Due to their distances from the Site, impacts to the LWSs are expected to be avoided.	Negligible	Negligible (Not Significant)

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
Macrophytes Aquatic Macroinvertebrates	To be determined when more baseline data becomes available.	<p>Direct loss or physical disturbance/degradation of habitat and species within Area 8.</p> <p>Increased pollution risk from sedimentation caused by surface runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.</p> <p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation.</p>	To be determined when more baseline data becomes available.	To be determined when more baseline data becomes available.
Freshwater Fish	To be determined when more baseline data becomes available.	<p>Direct loss or physical disturbance/degradation of habitat and species within the Area 8.</p> <p>Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.</p>	To be determined when more baseline data becomes available.	To be determined when more baseline data becomes available.

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
		<p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation.</p> <p>Alterations to visual stimuli (artificial light spill) and the underwater soundscape during construction could result in direct harm and may cause disturbance/avoidance behaviours.</p>		
<p>Benthic Habitat and Associated Communities</p> <p>Marine Plants and Macroalgae</p>	High	<p>Direct loss or physical disturbance/degradation of habitats (including Annex I HPI and UKBAP, notably mudflats/coastal saltmarsh) and species within the Tees Estuary associated with potential improvement works to existing wharfs and increased navigation.</p> <p>Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) during improvement works to existing wharfs and increased navigation</p>	Medium	Major Adverse to Moderate Adverse (Significant)

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
		<p>in the Tees Estuary (resulting in wave wash disturbing sediment).</p> <p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on benthic communities and habitat through direct and indirect degradation.</p>		
Phytoplankton	Low	<p>Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) during improvement works to existing wharfs and increased navigation in the Tees Estuary (resulting in wave wash disturbing sediment).</p> <p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on phytoplankton species and habitat through direct and indirect degradation.</p>	Medium	Minor Adverse (not significant) to Moderate Adverse (Significant)

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
Marine Fish	Medium	<p>Direct loss or physical disturbance/degradation of habitats and species including lamprey which are a Local Priority Species within the Tees Valley BAP within the Tees Estuary associated with potential improvement works to existing wharfs and increased navigation.</p> <p>Disturbance to protected fish species in the Tees Estuary, including migratory species due to changes in visual stimuli, (notably artificial light spill) and underwater noise during construction (through potential improvement works to existing wharfs and increased vessel movements).</p> <p>Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil, or discharge of groundwater dewatering.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) during improvement works to existing wharfs and increased navigation in the Tees Estuary (resulting in wave wash disturbing sediment).</p>	Medium	Moderate Adverse (Significant)

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
		Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on marine fish species and habitat through direct and indirect degradation.		
Marine Mammals	High	<p>Disturbance to notable marine mammal species including harbour seals, grey seals and harbour porpoise present within the Tees Estuary due to changes in visual stimuli, (notably artificial light spill) through potential improvement works to existing wharfs and increased navigation.</p> <p>Changes in the behaviour due to disturbance (e.g. avoidance) and/or physical damage to marine mammals due to changes in the underwater soundscape through potential improvement works to existing wharfs and increased navigation.</p> <p>Increased pollution risk from sedimentation caused by surface water runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) during improvement</p>	Medium	Major Adverse to Moderate Adverse (Significant)

Important Ecological Feature (IEF)	Sensitivity of receptor	Likely Effect and Impact	Magnitude of Impact	Likely Significance of Effect
		<p>works to existing wharfs and increased navigation in the Tees Estuary (resulting in wave wash disturbing sediment).</p> <p>Increased water pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on marine mammals.</p> <p>Vessel strikes/collisions with marine mammals within the River Tees due to increased navigation.</p>		
INNS	N/A	Potential spread of INNS during construction activities through vessel/vehicle movements .	N/A	N/A

OPERATION PHASE

8.8.4. **Table 8-18** below, provides a summary of potential likely significant effects identified at this stage for the construction phase of the Proposed Scheme in the absence of mitigation.

Table 8-18: Summary of Potential Likely Effects During Operation Phase

Important Ecological Feature (IEF)	Sensitivity	Potential Impacts	Magnitude of Change	Likely significant effects
Teesmouth and Cleveland Coast Ramsar and SPA	N/A	Both of these designated sites have no aquatic habitats or species which are a qualifying feature or Reason for Designation. Therefore, they are not considered further in this assessment. Further details on the impacts to IEF at these designated sites can be found in Chapter 7: Terrestrial Ecology (Volume 1) .	N/A	N/A
Teesmouth and Cleveland Coast SSSI	High	<p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could result in habitat degradation and long-term loss of suitable habitat for the qualifying features (saltmarsh and harbour seals).</p> <p>Depending on the processes to be used within Area 8 during operation, permanent noise impacts may also be incurred to the SSSI and harbour seals which inhabit this area.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) associated with operational navigation (resulting from wave wash disturbing sediment).</p>	Medium	Major Adverse to Moderate Adverse (Significant)

Important Ecological Feature (IEF)	Sensitivity	Potential Impacts	Magnitude of Change	Likely significant effects
Teesmouth NNR	High	Due to its distance from the Site, direct impacts, and the majority of indirect impacts to the Teesmouth NNR are expected to be avoided. However, there may be indirect impacts on grey seals and harbour seals , which are an important mobile feature of the Teesmouth NNR.	Low	Moderate Adverse (Significant)
Berwick Hills LNR	Medium	Due to its distance from the Site and lack of hydrological connectivity to the Site, impacts to Berwick Hills LNR are expected to be avoided. Air quality impacts will be discussed in Chapter 5: Air Quality (Volume 1) .	Negligible	Negligible (Not Significant)
Greatham Creek North Bank Saltmarsh LWS Greenabella Marsh LWS	Low	Due to their distances from the Site, impacts to the LWSs are expected to be avoided.	Negligible	Negligible (Not Significant)
Macrophytes Aquatic Macroinvertebrates Freshwater Fish	To be determined when more baseline data becomes available.	Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation.	To be determined when more baseline data becomes available.	To be determined when more baseline data becomes available.

Important Ecological Feature (IEF)	Sensitivity	Potential Impacts	Magnitude of Change	Likely significant effects
Benthic Habitat and Associated Communities Marine Plants and Macroalgae Marine Fish	High	<p>Loss or physical disturbance/degradation of habitats (including HPI and UKBAP, notably mudflats/coastal saltmarsh) and species due to increased operational navigation in the Tees Estuary.</p> <p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact through direct and indirect degradation.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) associated with operational navigation (resulting from wave wash disturbing sediment).</p>	Medium	Major Adverse to Moderate Adverse (Significant)
Phytoplankton	Low	<p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact through direct and indirect degradation.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) associated with operational navigation (resulting from wave wash disturbing sediment).</p>	Medium	Minor Adverse (not significant) to Moderate Adverse (Significant)

Important Ecological Feature (IEF)	Sensitivity	Potential Impacts	Magnitude of Change	Likely significant effects
Marine Mammals	High	<p>Disturbance and changes in behaviour and/or physical damage of notable marine mammal species including harbour seals, grey seals and harbour porpoise present within the Tees Estuary due to changes in the underwater soundscape through increased operational navigation.</p> <p>Disturbance/avoidance behaviours in pinnipeds due to changes in the airborne noise. Notably, avoidance/disturbance to haul out or breeding locations.</p> <p>Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) associated with operational navigation (resulting from wave wash disturbing sediment).</p> <p>Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water.</p> <p>Vessel strikes/collisions with marine mammals within the River Tees due to increased navigation.</p>	Medium	Major Adverse to Moderate Adverse (Significant)
INNS	N/A	Potential spread of INNS during operational navigation.	N/A	N/A

8.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 8.9.1. This section considers any additional mitigation measures which are likely to be required to address significant effects as assessed in **Section 8.8**.
- 8.9.2. Mitigation measures described below are based upon the known ecological baseline, current Proposed Scheme information, and assumed potential impacts resulting from the Proposed Scheme at the time of writing. As the design evolves and the full assessment is completed, these measures will be refined and updated and presented within the ES.
- 8.9.3. Mitigation measures will be refined further throughout the design process. This will be undertaken and in response to the results of remaining freshwater and marine ecology surveys to be completed, as well as further information being provided from environmental disciplines on which the terrestrial ecology assessment partly relies.

CONSTRUCTION PHASE

- 8.9.4. Mitigation during construction is likely to include the following measures:
- Directional lighting will be used to reduce adverse impacts upon fauna, such as fish. Lighting must be switched-off when not in use and, where possible, positioned so as not to spill on to adjacent habitats.
 - Exclusion zones will be demarcated and enforced around areas of invasive species to avoid spread or propagation. Biosecurity measures will be implemented during construction to prevent the spread of INNS.
 - Surface water runoff from construction areas into watercourses must be avoided and appropriate preventative measures, for example silt fencing or cut-off ditches, proactively installed.
 - Chemicals and fuels must be stored in secure containers located away from watercourses or waterbodies. No refuelling of plant or machinery should take place near water environments.

OPERATION PHASE

- 8.9.5. Design and enhancement measures, mentioned above, would seek to minimise and, where possible, enhance biodiversity during operation. Further details of what the design and enhancement measures would comprise will be provided in the ES.

ENHANCEMENT MEASURES

- 8.9.6. With regard to habitat compensation and enhancement, the principles of BNG will be applied. Further information on the BNG methodology is provided in **Chapter 2: Site and Proposed Scheme Description (Volume 1)** and **Chapter 7: Terrestrial Ecology (Volume 1)**.

8.10. MONITORING

- 8.10.1. As outlined in **Section 8.7** the presence of an ECoW is likely to be required for various elements of the construction phase to carry out update surveys and direct works

supervision in relation to certain species. The timing and frequency of ECoW presence will be dependent on the final works programme and to what extent works can be timed to avoid sensitive periods (or not).

- 8.10.2. Further details in relation to potential monitoring requirements will be provided in the ES and BNG assessment.

8.11. RESIDUAL EFFECTS

- 8.11.1. Based on the baseline information currently available, it is not possible to assess potential residual effects in full. Further surveys and assessment in relation to freshwater and marine ecology are required beyond this PEIR stage in order to help determine any potential significant effects and a comprehensive assessment of the potential residual effects will be provided in the ES. The further survey schedule can be found in **Table 8-3**. However, an assessment of potential residual effects at the time of writing has been provided below. **Table 8-19**, below, summarises the residual effects associated with the Proposed Scheme.

Table 8-19: Summary of Residual Effects for Freshwater and Marine Receptors

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Construction Phase				
Noise and Vibration, Artificial lighting, and Visual Disturbance to harbour seals and their breeding locations in the SSSI.	Teesmouth and Cleveland Coast SSSI	Major Adverse to Moderate Adverse (Significant)	Mitigation to be determined when full ecology baseline and further design information are available. This will be provided in the ES.	Residual effects will be determined when full ecology baseline data and further design information become available. This will be provided in the ES.
Changes to water quality (including suspension of sediment bound contaminants) associated with increased navigation (resulting from wave wash disturbing sediment).	Teesmouth and Cleveland Coast	Major Adverse to Moderate Adverse (Significant)		
Increased pollution risk from spillages and dust deposition.	Teesmouth and Cleveland Coast SSSI	Major Adverse to Moderate Adverse (Significant)		
Indirect impacts on grey seals and harbour seals, which are an important mobile feature of the Teesmouth NNR.	Teesmouth NNR	Moderate Adverse (significant)		
Due to its distance from the Site and lack of hydrological connectivity to the Site, impacts to Berwick Hills LNR	Berwick Hills LNR	Negligible (Not Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
are expected to be avoided. Air quality impacts will be discussed in Chapter 5: Air Quality (Volume 1).				
Due to their distances from the Site, impacts to the LWSs are expected to be avoided.	Greatham Creek North Bank Saltmarsh LWS and Greenabella Marsh LWS	Negligible (Not Significant)		Negligible (Not Significant)
Direct loss or physical disturbance/degradation of habitat and species within Area 8.	Macrophytes Aquatic Macroinvertebrates Freshwater Fish	To be determined when more baseline data becomes available.		Residual effects will be determined when full ecology baseline data and further design information become available. This will be provided in the ES.
Increased pollution risk from sedimentation caused by surface runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.	Macrophytes Aquatic Macroinvertebrates Freshwater Fish	To be determined when more baseline data becomes available.		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Increased pollution risk from sedimentation caused by surface runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.	Benthic Habitats and Associated Communities Marine Plants and Macroalgae Marine Fish Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Increased pollution risk from sedimentation caused by surface runoff from areas of bare earth, construction materials such as aggregate, stockpiles of topsoil or discharge of groundwater dewatering.	Phytoplankton	Moderate Adverse (Significant)		
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation	Macrophytes Aquatic Macroinvertebrates Freshwater Fish	To be determined when more baseline data becomes available.		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation	Benthic Habitats and Associated Communities Marine Plants and Macroalgae Marine Fish Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation	Phytoplankton	Moderate Adverse (Significant)		
Alterations to visual stimuli (artificial light spill) and the underwater soundscape.	Freshwater Fish	To be determined when more baseline data becomes available.		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Direct loss or physical disturbance/degradation of habitats and species within the Tees Estuary associated with potential improvement works to existing wharfs and increased navigation.	Benthic Habitats and Associated Communities Marine Plants and Macroalgae Marine Fish	Major Adverse to Moderate Adverse (Significant)		
Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) during improvement works to existing wharfs and increased navigation (resulting in wave wash disturbing sediment). sediment).	Benthic Habitats and Associated Communities Marine Plants and Macroalgae Marine Fish Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) during improvement works to existing wharfs and increased navigation	Phytoplankton	Moderate Adverse (Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
(resulting in wave wash disturbing sediment). sediment).				
Disturbance to protected fish species, including migratory species in the Tees Estuary due to changes in visual stimuli, (notably artificial light spill) and underwater noise during construction (through potential improvement works to existing wharfs and increased vessel movements).	Marine Fish	Major Adverse to Moderate Adverse (Significant)		
Disturbance to notable marine mammal species including harbour seals, grey seals and harbour porpoise due to changes in visual stimuli, (notably artificial light spill) through potential improvement works to existing wharfs and increased navigation.	Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Changes in the behaviour due to disturbance (e.g. avoidance) and/or physical damage to marine mammals due to changes in the underwater soundscape through potential	Marine Mammals	Major Adverse to Moderate Adverse (Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
improvement works to existing wharfs and increased navigation.				
Vessel strikes/collisions with marine mammals within the River Tees due to increased navigation.	Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Potential spread of INNS during construction activities through vessel/vehicle movements.	INNS	N/A		
Operational Phase				
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could result in habitat degradation and long-term loss of suitable habitat for the qualifying features (saltmarsh and harbour seals.	Tees and Cleveland Coast SSSI	Major Adverse to Moderate Adverse (Significant)	Mitigation to be determined when full ecology baseline and further design information are available. This will be provided in the ES.	Residual effects will be determined when full ecology baseline data and further design information become available. This will be provided in the ES.
Depending on the processes to be used within Area 8 during operation, permanent noise impacts may also be	Tees and Cleveland Coast SSSI	Major Adverse to Moderate Adverse (Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
incurred to the SSSI and harbour seals which inhabit this area.				
Increased risk of pollution (including suspension of sediment bound contaminants) associated with operational navigation (resulting from wave wash disturbing sediment).	Tees and Cleveland Coast SSSI	Major Adverse to Moderate Adverse (Significant)		
Due to its distance from the Site, direct impacts, and the majority of indirect impacts to the Teesmouth NNR are expected to be avoided. However, there may be indirect impacts on grey seals and harbour seals, which are an important mobile feature of the Teesmouth NNR.	Teesmouth NNR	Moderate Adverse (Significant)		
Due to its distance from the Site and lack of hydrological connectivity to the Site, impacts are expected to be avoided. Air quality impacts will be discussed in Chapter 5: Air Quality (Volume 1).	Berwick Hills LNR	Negligible (Not Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Due to their distances from the Site, impacts are expected to be avoided.	Greatham Creek North Bank Saltmarsh LWS and Greenabella Marsh LWS	Negligible (Not Significant)		Negligible (Not Significant)
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation.	Aquatic Macroinvertebrates Macrophytes Freshwater Fish	Major Adverse to Moderate Adverse (Significant)		Residual effects will be determined when full ecology baseline data and further design information becomes available. This will be provided in the ES.
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation.	Benthic Habitats and Associated Communities Marine Plants and Macroalgae Marine Fish Marine Mammals	Major Adverse to Moderate Adverse (Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact on species and habitat through direct and indirect degradation.	Phytoplankton	Moderate Adverse (Significant)		
Loss or physical disturbance/degradation of habitats and species due to increased operational navigation.	Benthic Habitats and Associated Communities Marine Plants and Macroalgae Marine Fish	Major Adverse to Moderate Adverse (Significant)		
Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) associated with operational navigation (resulting from wave wash disturbing sediment).	Benthic Habitats and Associated Communities Marine Plants and Macroalgae, Marine Fish Marine Mammals	Major Adverse to Moderate Adverse (Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Increased pollution risk and changes to water quality (through suspension of sediment bound contaminants) associated with operational navigation (resulting from wave wash disturbing sediment).	Phytoplankton	Moderate Adverse (Significant)		
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact through direct and indirect degradation.	Benthic Habitats and Associated Communities Marine Plants and Macroalgae Marine Fish Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Increased pollution risk from spillage of fuels/harmful chemicals that may spill directly into or migrate to surface water, which could negatively impact through direct and indirect degradation.	Phytoplankton	Moderate Adverse (Significant)		

Description of the Effect	IEF	Significance of Effect with Embedded Mitigation	Additional Design Mitigation, Enhancement Measure	Residual Effect
Disturbance and changes in behaviour and/or physical damage of notable marine mammal species including harbour seals, grey seals and harbour porpoise present within the Tees Estuary due to changes in the underwater soundscape through increased operational navigation.	Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Disturbance/avoidance behaviours in pinnipeds due to changes in the airborne noise. Notably, avoidance/disturbance to haul out or breeding locations.	Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Vessel strikes/collisions with marine mammals within the River Tees due to increased navigation.	Marine Mammals	Major Adverse to Moderate Adverse (Significant)		
Potential spread of INNS during operational navigation.	INNS	N/A		

8.12. NEXT STEPS

- 8.12.1. Further survey and assessment work is required in order to obtain a full and complete baseline (See **Table 8-3** for a full list of scheduled surveys). The results of these surveys will be presented within the ES.
- 8.12.2. A detailed impact assessment of potential impacts on freshwater and marine ecology during the Construction and Operation Phases of the Proposed Scheme will be undertaken and included within the ES.
- 8.12.3. Further next steps include continuing with consultation with regulators and stakeholders; freshwater and marine ecology inputs into the BNG assessment; coordinating with the terrestrial ecology and water assessments; refining embedded and additional mitigation and completing the assessment of the effects and residual effects in the ES.

8.13. LIMITATIONS AND ASSUMPTIONS

- 8.13.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:
 - There is limited ecological data available on the freshwater and marine species that are found within the Zol. Data have been extracted from nearby EA monitoring locations to identify the species that may be present within the Site. A PEA has been undertaken for all areas within the Site. Further species-specific aquatic surveys will be carried out within freshwater and marine habitats at the Site.
 - Ecological data are usually valid for 18 months unless otherwise specified. The likelihood of surveys needing to be updated increases with time and is greater for mobile species or in circumstances where the habitat, or its management, has changed significantly since the surveys were undertaken. Factors to be considered include (but are not limited to) whether a site supports, or may support, a mobile species which could have moved on to site or changed its distribution within a site⁵⁶. Desk study data that is older than 18 months has been used within this assessment to provide context on the species that may be present within the Study Area. Further surveys have been recommended in order to gain more up to date baseline data.
 - Survey data will provide a snapshot of the ecological baseline at the time of survey.
 - All information received and researched that facilitated this Chapter is true at the time of writing.

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