# Immingham Green Energy Terminal

TR030008

Volume 7

7.6 Shadow Habitats Regulations Assessment

Planning Act 2008

Regulation 5(2)(g)

The Infrastructure Planning
(Applications: Prescribed Forms and Procedure)
Regulations 2009 as amended)

~~June~~July 2024

**Infrastructure Planning**

**Planning Act 2008**

**The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended)**

# Immingham Green Energy Terminal

# Development Consent Order 2023

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# 7.6 Shadow Habitats Regulations Assessment

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# Executive Summary

This report provides information for the Secretary of State, as the relevant Competent Authority for the DCO application, to undertake the first two stages of a Habitats Regulations Assessment as required under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended).

The Stage one (Screening) assessment has considered how the Project might affect five European sites. This screening stage concluded that Likely Significant Effects could not be discounted with respect to the Humber Estuary SAC, Humber Estuary SPA, Humber Estuary Ramsar site and The Wash and North Norfolk Coast.

The impact pathways screened into stage 2 (AA) covered a range of pathways including habitat loss, changes to habitats, water quality changes, airborne noise and visual disturbance, underwater noise and vibration and the introduction and spread of non-native species.

At Stage two AA, further information has been collated to examine the potential for changes in the baseline conditions as a result of the Project with reference to the conservation objectives for each site. Where relevant, mitigation measures have been proposed to reduce the potential for adverse effects.

The assessment has concluded that for the majority of pathways there is no potential for an adverse effect on site integrity or any potential for the predicted effects to compromise any of the conservation objectives with no mitigation required. However, mitigation has been identified in relation to the effects of airborne noise and visual disturbance during construction which includes restrictions on working over winter in certain locations, acoustic barriers and visual screens, soft-start marine piling and cold weather restrictions. In addition, due to the uncertainty associated with the techniques that will be used to remove the pipe racks within Work Area 2 (the jetty access road) and plant and equipment on the approach jetty topside associated with hydrogen production (within Work Area 1), a commitment has been made to undertake these works outside of the overwintering period.

Based on the distribution of birds, the likely level of disturbance and the Applicant's commitment to mitigation, it is considered that there will be no adverse effects on the integrity of either the Humber Estuary SPA or Ramsar from the effects of airborne noise and visual disturbance.

Mitigation has also been identified in relation to the effects of underwater noise and vibration during marine piling which includes soft-start marine piling, vibro marine piling where possible, seasonal marine piling restrictions, night-time marine piling restrictions and use of Marine Mammal Observers. Based on the assessment of effects on qualifying species (river and sea lamprey and grey seal), the likely level of disturbance and the Applicant's commitment to mitigation, it is considered that there will be no adverse effects on the integrity of the Humber Estuary SAC or Ramsar from the effects of underwater noise and vibration during marine piling. There is also considered to be no adverse effects on the integrity of The Wash and North Norfolk Coast SAC (as a result of underwater noise and vibration during marine piling on the common seal qualifying feature), based on the Applicant's commitment to mitigation.

A review of other plans and projects that could contribute to effects has established that no significant adverse in-combination effects on site integrity with other plans and projects will occur.

In conclusion, based on best available scientific information and professional judgement, it is considered that the construction and consequent operation of the Project (alone or in combination with other plans or projects) will not have an adverse effect on the integrity of any European designated sites in view of that sites conservation objectives.

# 1. Introduction

## 1.1. Overview

1.1.1. The Immingham Green Energy Terminal ("IGET") (hereafter 'the Project') is a proposal by Associated British Ports ('ABP') (hereafter 'the Applicant') to construct and facilitate the operation by multiple users of a multi-user liquid bulk terminal, which would be located on the eastern side of the Port of Immingham (hereafter 'the Port). The Project is a Nationally Significant Infrastructure Project ("NSIP") and will therefore require submission of an application for a Development Consent Order ("DCO").

1.1.2. This Shadow Habitats Regulations Assessment ("HRA") presents Stages 1 (Screening) and 2 (Appropriate Assessment) and has been prepared to support the DCO application for the Project.

1.1.3. The land on which the Project is to be constructed (the "Site") is located in North East Lincolnshire on the south bank of the Humber Estuary to the east of the Port. The boundary of the Project is shown in **Plate 1** and is approximately centred on National Grid Reference (NGR) E520783 N415271.

## 1.2. Project Background

1.2.1. The Project would comprise the alteration of a harbour facility for the construction, operation and maintenance of a multi-user green energy terminal to facilitate the import and export of bulk liquids associated with the energy sector, together with associated development. The terminal would consist of a jetty and associated loading/ unloading infrastructure and pipelines.

1.2.2. Initially, the terminal would be used for the import and export of green ammonia to be converted to green hydrogen. To facilitate this, a hydrogen production facility, comprising associated ammonia handling equipment, storage and processing units would be constructed as part of the Project. Other proposed uses for the green energy terminal will come forward in due course and separate applications submitted as required. It is anticipated that a future use of the terminal will be the import of liquefied carbon dioxide to connect to adjacent carbon transport and storage networks for sequestration in the North Sea.

1.2.3. The Site is located in North East Lincolnshire on the south bank of the Humber Estuary to the east of the Port. A detailed description of the works is provided in the parameters section of **Chapter 2: The Project [REP3-022]**.

1.2.4. The following is a summary of the main elements of each of Work Nos 1-10:

a. The Nationally Significant Infrastructure project ("NSIP"), **Work No. 1**, comprising:

   i. On the marine side, a terminal for liquid bulks: comprising:

      A. A jetty (defined by **Work No. 1a**) including a loading platform, associated dolphins, fenders and walkways, topside infrastructure but not limited to control rooms, marine loading arms, pipe-racks, pipelines and other infrastructure.

B. A single berth, with a berthing pocket with a depth of up to 14.5m below chart datum.

ii. related landside infrastructure including, but not limited to, a jetty access ramp, a flood defence access ramp and works to raise the seawall locally under the jetty access ramp.

b. Associated Development on the landside, comprising:

i. A corridor between the new jetty and Laporte Road which would support a private road (the 'jetty access road'), pipe-racks, pipelines to enable the ammonia import to the East Site, as well as security gates, a security building, a power distribution building and associated utilities – (**Work No. 2**).

ii. 'East Site - Ammonia Storage' (**Work No. 3**) on which an ammonia storage tank and related plant including an ammonia tank flare stack would be constructed (**Work No. 3a**) as well as additional buildings (including welfare building, power distribution building and a process instrumentation building), pipe-racks, pipelines, pipes, cable-racks, utilities and other infrastructure.

iii. Construction of a culvert (**Work No. 4**) under Laporte Road for pipelines, pipes and cables and other conducting media linking the two parts of the East Site.

iv. 'East Site – Hydrogen Production Facility' (**Work No. 5**) on which up to three hydrogen production units and associated plant including flue gas stacks and flare stacks would be constructed (**Work No. 5a**) together with additional buildings (including process control building, power distribution buildings, process instrumentation buildings, analyser shelters), pipe-racks, pipelines, pipes, utilities and other infrastructure.

v. Underground pipelines, pipes, cables and other conducting media (**Work No. 6**), between the East and West Sites, for the transfer of ammonia, hydrogen, nitrogen and utilities, with cathodic protection against saline corrosion.

vi. 'West Site' (**Work No. 7**) involving the construction of up to three hydrogen production units with associated flue gas stacks and flare stacks and up to four liquefier units (**Work No. 7a** and **Work No. 7b** combined); hydrogen storage tanks, hydrogen trailer filling stations, a hydrogen vent stack and associated process equipment (**Work No. 7c**); and hydrogen vehicle and trailer filling stations, hydrogen compressors and associated process equipment (**Work No. 7d**). Also additional buildings (including but not limited to control room and workshop building, security and visitor building, contractor building, warehouse, driver administration building, safe haven building, electrical substation and metering station, power distribution buildings, process instrumentation buildings, analyser buildings and additional temporary buildings during construction), process and utility plant including cooling towers and pumps, fire water tank, instrument air equipment, pipe-racks, pipelines, pipes, cable-racks, utilities and other infrastructure;

vii. Formation of temporary construction and laydown areas on Queens Road (**Work No. 8**) and off Laporte Road (**Work No. 9**).

viii. Temporary removal of street furniture and modification of overhead cables on Kings Road (**Work No. 10**) associated with the transport of large construction components from the Port to the Site.

c. Appropriate topside infrastructure installed on the jetty to load and unload vessels.

d. A small capital dredge (approximately 4000 m$^3$).

e. Disposal of dredged material at sea at licensed disposal sites.

1.2.5. The hydrogen production facility is intended to be a continuous operation, although this would be dependent upon shipping frequency. The intention is therefore that the facility will operate 24 hours a day, seven days a week and 365 day a year. The facility would have a planned preventive maintenance programme during the operational phase. The flare stacks proposed as part of the Project are relatively small in scale (as compared to those associated with offshore oil and gas platforms or refineries), with the flame largely enclosed as a result of shrouding. Furthermore, they are only required to be used during start up, shut down and emergency use (typically less than 5% of the time annually).

1.2.6. During operation, the Terminal will operate 24 hours a day, seven days a week and 365 days a year and would be able to accommodate up to 292 vessel calls per year. Heavy Goods Vehicles (HGVs) would use the A1173 to access the Site. Operational traffic movements are detailed in **Chapter 11: Traffic and Transport [APP-053]**. In summary, it is anticipated that during the operational phase of the Project, total HGV movements at the Site would be approximately 96 movements (48 in and 48 out) per day. These figures include movements associated with the delivery of consumables and removal of waste products.

1.2.7. During operation of the Project, maintenance dredging will potentially be required in the same way as currently occurs at the Port. The modelling of the scheme (as reported in **Chapter 16: Physical Processes [APP-058]**) indicates that the berth pocket, once dredged, will remain swept clear of deposited material by the flood and ebb tidal flows (in much the same way the existing Immingham Oil Terminal berths are). Consequently, the need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Should maintenance dredging be required, it is proposed to be incorporated within the maintenance dredge licence for Immingham (L/2014/00429/1) as part of the renewal of the licence at the end of 2025.

1.2.8. Regarding engineering and maintenance works in Work No. 1, this activity is expected to be limited and only required occasionally.

1.2.9. Further information on the operational phase is provided in Section 2.6 of Chapter 2: The Project [**REP3-022**].

1.2.10. No provision has been made for the decommissioning of the jetty, jetty head, jetty access ramp and the jetty access road. This is because these elements would, once constructed, become part of the fabric of the Immingham port estate and would, in simple terms, continue to be maintained so that they can be used for port-related activities to meet a long-term need. On this basis decommissioning of these elements is not considered within the Shadow HRA as no pathways exist that would cause potential effects on features of the Humber Estuary European Marine Site.

1.2.11. When appropriate, the infrastructure associated with the hydrogen production facility may be decommissioned. The majority of the proposed landside decommissioning works are well in excess of 200 m from the foreshore (located within Work Area 5). Similarly, there are no areas of terrestrial habitat within or adjacent to the Project boundary that are considered functionally linked land (and as such do not provide important habitat for SPA species). On this basis, marine ornithology receptors (i.e. coastal waterbirds) are considered to be out of the zone of potential effects associated with most decommissioning elements. The exception to this will be the removal of pipe racks within Work Area 2 (the jetty access road) and plant and equipment on the approach jetty topside associated with hydrogen production (within Work Area 1) which have been considered in the Shadow HRA.

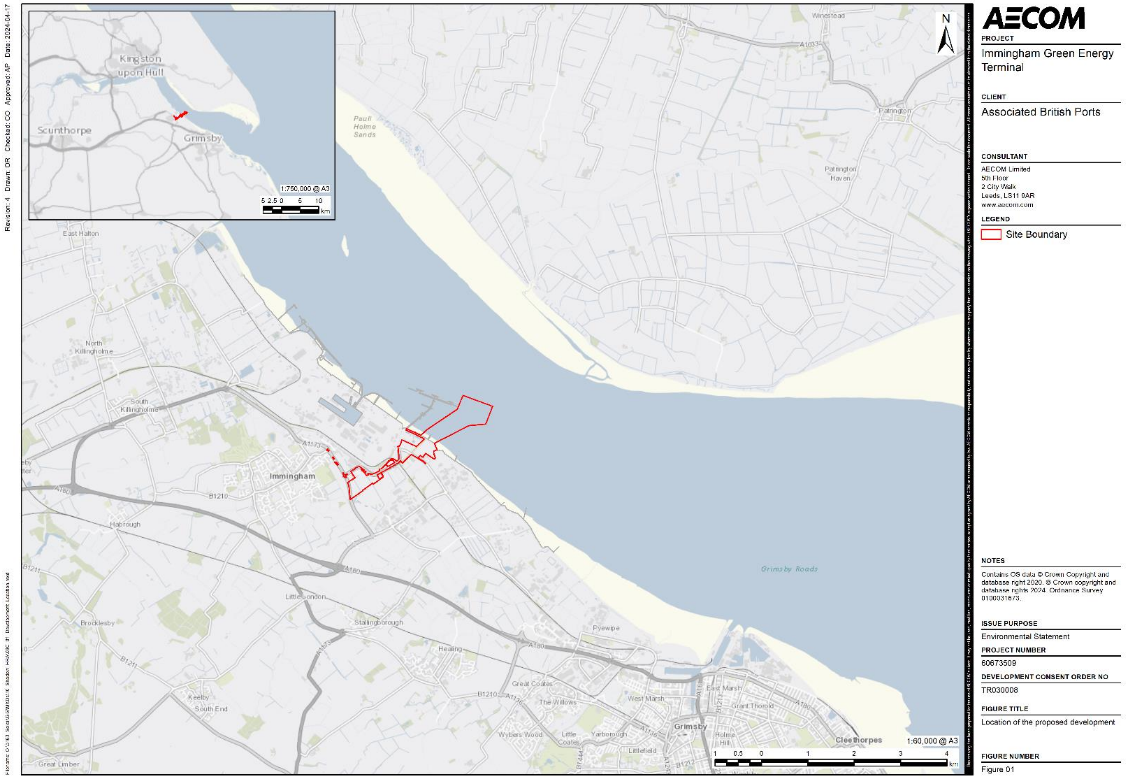
1.2.12. **The consenting route** – given the effect of the proposed alteration to the existing harbour facility is to increase by at least the relevant quantity per year (5 million tonnes) the quantity of material the embarkation or disembarkation of which the facilities are capable of handling, the Project has been taken forward as an NSIP. In light of this, ABP are submitting a DCO application for authorisation for the Project and has prepared an Environmental Statement ("ES") as part of the DCO application process. Ultimately the DCO application will be submitted to the Secretary of State for Transport (the "Secretary of State") for authority to construct and then operate the Project. Additional consents and approvals that are required for the construction and operation of the Project will, with the agreement of the appropriate consenting bodies, be incorporated within the final DCO. This includes a deemed marine licence, in consultation with the Marine Management Organisation ("MMO"), as part of the DCO.

1.2.13. A single Shadow Habitat Regulations Assessment ("HRA") has been produced for the entirety of the Project. The information within this report will assist the Competent Authority (in this case the Secretary of State in respect of the determination of the DCO application) with their review under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations')[1] in determining the need for Appropriate Assessment ("AA").

1.2.14. This report has been informed by the assessments undertaken in **Chapter 6: Air Quality [APP-048]**, **Chapter 9: Nature Conservation (Marine Ecology) [APP-051]**, **Chapter 10: Ornithology [APP-052]**, **Chapter 16: Physical Processes [APP-058]** and **Chapter 17: Marine Water and Sediment Quality [APP-059]** of the **ES**. A description of the Project and details on construction and operational methodologies are provided in **Chapter 2: The Project [REP3-022]** of the **ES**.

[1] Following the UK leaving the EU, these have been modified by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

## Plate 1: Location of the Project



## 1.3. The Habitats Regulations Assessment Process

1.3.1. The 'Habitats Regulations') (Ref 1-1) transposed the requirements of Council Directive 92/43/EEC (as amended) (Ref 1-2) on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') and Council Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive') (Ref 1-3) into UK law. Following the UK leaving the EU, the Habitats Regulations have been amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ref 1-4). The only material modification of relevance to this assessment is how the protected site network is referred to (see **Paragraph 1.3.2**).

1.3.2. The Habitats Regulations as amended Ref 1-4 refers to a National Site Network within the UK which comprises the protected sites already designated under the Habitats Regulations (Ref 1-1). In this report the sites within the National Site Network have been referred to either by their designation (e.g. Special Area of Conservation ("SAC")) or collectively as 'European sites'.

1.3.3. The European sites protected under the Habitats Regulations include SACs, Sites of Community Importance ("SCIs"), candidate SACs ("cSACs") and Special Protection Areas ("SPAs"). According to Paragraph 181 of the National Planning Policy Framework ("NPPF") (Ref 1-5), in England equivalent protection also applies to Ramsar sites (designated under the 1971 Ramsar Convention (Ref 1-6) for their internationally important wetlands), possible SACs ("pSAC"), potential Special Protection Areas ("pSPA"), and proposed Ramsar sites and any sites identified, or required, as compensatory measures for adverse effects on any of the aforementioned sites.

1.3.4. As Competent Authority for the DCO application, the Secretary of State is required to take account of the Habitats Regulations and undertake an AA of the Project where a conclusion is reached that the Project (either on its own or in combination with other plans or projects) would be likely to have a significant effect, directly and/or indirectly, on the European/Ramsar sites. As summarised above, Regulation 63(1) of the Habitats Regulations states that:

> *"A competent authority, before deciding to undertake, or give any consent, permission, or other authorisation for a plan or project which:*
>
> *a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in-combination with other plans or projects); and*
>
> *b) is not directly connected with or necessary to the management of the site*
>
> *must make an appropriate assessment of the implications for the site in view of that site's conservation objectives".*

1.3.5. The decision as to whether an AA is required is based on an assessment of likely significant effect ("LSE"). LSE is recognised as being an objective judgement or a statement that the anticipated effects of the proposal will be more than trivial (i.e., that the anticipated changes resulting from a proposal have the potential to impact on an interest feature of a European/Ramsar site). If a project (or plan) could have an LSE on a European/Ramsar site, it does not automatically follow that an impact will occur. The decision of LSE is purely an indication of the need for an AA (Ref 1-7).

1.3.6. In an AA, it is necessary to determine whether the project or plan would result in an adverse effect on the integrity ("AEOI") of the European/Ramsar site(s) in view of the site's conservation objectives. The integrity of a site has been defined as the "coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated" (Ref 1-8).

1.3.7. Subject to the provisions of Regulation 64 and 68 of the Habitat Regulations, the competent authority may only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the European sites.

1.3.8. Where it cannot be demonstrated that a project will not have an AEOI of the European sites, or there is insufficient certainty of an avoidance of an adverse effect, the activities can only proceed where the requirements of the derogation process under Regulations 64 and 68 of the Habitats Regulations is satisfied. In this case it must be demonstrated that there are no alternative solutions which achieve the project objectives and would avoid or have a lesser effect on the European sites. It must then be demonstrated that the Project is necessary for Imperative Reasons of Overriding Public Interest ("IROPI") and to ensure that adequate compensation, usually in the form of replacement habitat, has been secured to protect the overall coherence of the UK National Site Network (i.e., European/Ramsar sites) (Ref 1-9).

1.3.9. The decision as to whether the integrity of the European sites is adversely affected will be made by the Secretary of State as Competent Authority for the DCO application, in consultation with Natural England.

1.3.10. The Shadow HRA process for NSIPs comprises a three stage process, as detailed in the Planning Inspectorate ("PINS") Advice Note 10 (Ref 1-9):

- **Stage 1. Screening** – check if the proposal is likely to have a significant effect on the qualifying features of European site(s)'s , both alone or in combination with other plans or projects. At this stage, and in light of the decision of the Court in the case of (People Over Wind and Sweetman v Coillte Teoranta (Case C-323/17)), mitigation measures proposed for the purpose of avoiding or minimising risk to a European site may not be taken into account. If a conclusion of no LSE is reached for all/the European site(s), their qualifying features having been fully taken into account, it is not necessary to proceed to the next stage of HRA.
- **Stage 2. Appropriate assessment** – assess the implications of the proposal for the qualifying features of the European site(s), in view of the site(s)' conservation objectives and identify ways to avoid or minimise any effects. Where there is a negative assessment, either because an AEOI is found to be likely or cannot be excluded, consent must be refused unless an exemption (Stage 3 (Derogation)) is justified.
- **Stage 3. Derogation** – following a negative assessment, consider if proposals qualify for an exemption. There are three tests to this stage to be followed in order: demonstrating that there are no alternative solutions to

deliver the project objectives demonstrating that there are IROPI; and demonstrating that satisfactory compensatory measures been secured which ensure that the coherence of the European Sites is protected. Each test must be passed in sequence for a derogation to be granted.

## 1.4. Report Structure

1.4.1. This report has been structured as follows:

a. **Section 1: Introduction** provides a brief description of the Project and an overview of the need for an HRA.

b. **Section 2: Consultation** presents the outcome of the consultation that has been undertaken to date, along with how it has influenced the Shadow HRA.

c. **Section 3: Stage 1 - Screening** reviews the location of the Project in relation to European/Ramsar sites and the potential for it to result in an LSE on the interest features of these sites.

d. **Section 4: Stage 2 – Appropriate Assessment** reviews the potential for the Project to result in an AEOI on the interest features of European/ Ramsar sites, including in-combination effects.

e. **Section 5: Conclusions** presents a brief summary of the findings of this report.

# 2. Consultation

## 2.1. Introduction

2.1.1. A scoping exercise was undertaken in August 2022 to establish the form and nature of the Shadow HRA, and the approach and methods to be followed. The Scoping Report (**Appendix 1.A [APP-167]**) records the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria being applied in the assessment to identify and evaluate the likely significant effects of the Project on designated sites. A Scoping Opinion was adopted by the Secretary of State on 10 October 2022 **[APP-168]**.

2.1.2. Statutory Consultation took place between 9 January and 20 February 2023 in accordance with the Planning Act 2008. The Applicant prepared a Preliminary Environmental Information Report ("PEI" Report), which was publicised at the consultation stage.

2.1.3. As a result of consideration of the responses to the first Statutory Consultation, the developing environmental assessments and through ongoing design-development and assessment, a series of changes within the Project were identified. A second Statutory Consultation took place between 24 May and 20 July in accordance with the Planning Act 2008 and a PEI Report Addendum was publicised to support the consultation.

2.1.4. The consultation undertaken with statutory consultees to inform this Shadow HRA, including a summary of comments raised via the formal scoping opinion (**Appendix 1.B [APP-168]**) and in response to the formal consultation and other pre-application engagement is summarised in **Table 1**.

2.1.5. Other topic-specific comments are included in the individual ES chapters (e.g. **Chapter 9: Nature Conservation (Marine Ecology) [APP-051]** and **Chapter 10: Ornithology [APP-052]**).

**Table 1: Summary of consultation responses relating to Shadow HRA.**

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
|---|---|---|---|
| Natural England | Scoping opinion, Chapter 5: Air Quality<br>10 October 2022 | We note and welcome the report's reference to the assessment of air quality issues arising from traffic generation during the construction and operational lifetime of the scheme (para 5.2.1). Natural England has produced guidance for public bodies to help assess the impacts of road traffic emissions to air quality capable of affecting European Sites. Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations -NEA001 | The air quality assessment does quantify the impact of onsite emissions, including those from docked vessels, on air quality sensitive habitats, including nearby saltmarsh habitat within the SAC. |
| Natural England | Scoping opinion, Chapter 5: Air Quality<br>10 October 2022 | With regard to the construction phase the focus on PM10, set out in this para (5.6.2) should be reviewed with regard to its suitability for ecological receptors including designated sites in the context of the APIS information (site relevant critical loads).NO2 and PM2.5 should also be included in this assessment. | The construction phase assessment on air quality reported in the ES (**Chapter 9: Nature Conservation (Marine Ecology) [APP-051]**) has been undertaken in line with relevant Institute of Air Quality Management ("IAQM") guidance and includes consideration of relevant impacts at sensitive habitats. |
| Planning Inspectorate | Scoping opinion, Chapter 7: Nature Conservation (Terrestrial Ecology)<br>10 October 2022 | Impacts on designated marine ecology features would be assessed in accordance with ES Chapter 8 and impacts on designated ornithology features would be assessed in accordance with Chapter 9. The Inspectorate agrees that this matter can be scoped from terrestrial ecology assessment on the basis that no impacts are anticipated on the Humber Estuary Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar and Site of Special Scientific Interest (SSSI), collectively referred to as the Humber EMS, and as impacts on marine ecology and ornithology for these designated sites will be assessed elsewhere in the ES. | Scoping opinion noted. The effects on European designated sites are considered in **Chapters 9: Nature Conservation (Marine Ecology) [APP-051]**, **Chapter 10: Ornithology [APP-052]** and in the Shadow HRA (this report). |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
|---|---|---|---|
| Natural England | Scoping opinion, Chapter 9: Nature Conservation (Marine Ecology)<br>10 October 2022 | " The development site is within or may impact on the following European/internationally designated nature conservation site(s):<br>•Humber Estuary Special Area of Conservation (SAC)<br>•Humber Estuary Special Protection Area (SPA);<br>•Humber Estuary Ramsar site.<br>•Greater Wash Special Protection Area (SPA)<br>Natural England broadly agrees with this section of the Scoping Report which detail the potential impact pathways on the designated sites during both construction and operation phases of the proposed development. | Scoping opinion noted. These sites are considered within the Shadow HRA (this report). |
| Planning Inspectorate | Scoping opinion, Chapter 9: Nature Conservation (Marine Ecology)<br>10 October 2022 | In addition to the Humber Estuary European sites, the Proposed Development may also impact on the Greater Wash SPA and this should be considered within the ES. | Noted. The SPA is considered in the Shadow HRA (this report) in **Section 3** (Stage 1-Screening). |
| Natural England | Statutory Consultation January 2023 | **Internationally and nationally designated sites**<br>The application site is in close proximity to European designated sites (also referred to as Habitat sites), and therefore has the potential to affect their interest features. European sites are afforded protection under the Conservation of Habitats and Species Regulations 2017, as amended (the 'Habitats Regulations'). The application site is within and adjacent to the Humber Estuary Special Area of Conservation (SAC) and Special Protection Area (SPA) which are European sites. The site is also listed as Humber Estuary Ramsar Site 1 and notified at a national level as Humber Estuary Site of Special Scientific Interest (SSSI). | Stage 1 (Screening) and Stage 2 (Appropriate Assessment) of this Shadow HRA considers potential impacts on international designations with respect to LSE and the potential for AEOI. |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
|---|---|---|---|
| | | The consultation documents provide some screening information for the Habitats Regulations Assessment (HRA). It is Natural England's advice that the proposal is not directly connected with or necessary for the management of the European site. You should therefore determine whether the proposal is likely to have a significant effect on any European site, proceeding to the Appropriate Assessment stage where significant effects cannot be ruled out. | |
| Natural England | Statutory Consultation January 2023 | **PEIR Appendix 9.C HRA screening**<br>Natural England has reviewed PEIR Appendix 9C which provides the results of a preliminary screening exercise identifying the potential impact pathways.<br>Natural England is broadly in agreement with the high-level impact pathways set out in Table 3: Potential effects on the European sites, however future iterations will need to drill down further into the impacts on the individual qualifying features of the designated sites and demonstrate a much greater level of detail of when these impacts may arise.<br>The summary of preliminary conclusions at 3.4 presents a list of features that have been screened in for further assessment, but where features have been screened out there is no explanation provided. Natural England considers that it is important to provide justification related to the screening of features, particularly where an impact pathway has been screened out. We appreciate that this information may be within other chapters of the PEIR, if so, there should be clear links to the relevant sections. | Noted. Stage 1 of the full Shadow HRA includes further detail on the rationale for screening out features **(Section 3**). |
| Natural England | Statutory Consultation January 2023 | **Chapter 6: Air Quality**<br>1) Potential air quality impacts from traffic during construction and operation phases Paragraph 6.3.13 states that Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) guidance has been used | 1) The method of assessment of road traffic emissions impacts has been set out in **Section 6.4** of **Chapter 6: Air Quality [APP-048]**. The assessment presented in Section 4.7 of this document has been undertaken in line with relevant and appropriate guidance. This |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
|---|---|---|---|
| | | to inform the assessment. Natural England guidance NEA0012 should also be followed when undertaking the assessment.<br>2) Ammonia (NH3), along with nitrous oxides (NOx), can contribute to N-deposition in the soil and potential eutrophication of habitats. Whereas background levels of nitrous oxides have shown a steady decline over time due to reduced emissions from vehicles and other sources, levels of ammonia have remained relatively stable over the last 30 years. Ammonia can be emitted from vehicle exhaust emissions as a by-product of the catalytic conversion process designed to reduce emissions of nitrogen oxide.<br>3) Ammonia emissions from road traffic could make a significant difference to nitrogen deposition close to roads. As traffic composition transitions toward more petrol and electric cars (i.e., fewer diesel cars on the road), catalytic converters may aid in reducing NOx emissions but result in increased ammonia emissions (see https://www.aqconsultants.co.uk/news/february-2020-(1)/ammonia-emissions-from-roads-for-assessing-impacts). Therefore, we advise that further consideration is needed within the air quality assessment.<br>4) There are currently two models which can be used to calculate the ammonia concentration and contribution to total N deposition from road sources. One of these models is publicly available and called CREAM (Air Quality Consultants - News - Ammonia Emissions from Roads for Assessing Impacts on Nitrogen-Sensitive Habitats (aqconsultants.co.uk), and there is another produced by National Highways.<br>5) Paragraph 6.8.47 states that it is likely that during operation the traffic movements will equal approximately 96 two-way movements per day, which is below the significance threshold identified in Natural England guidance NEA001. We recommend that this is still considered within the Shadow HRA, particularly if these numbers are subject to change. | includes reference to Natural England guidance, where there is the potential for road traffic emissions to impact on a relevant and sensitive habitat.<br>2) Noted.<br>3) The assessment reported in **Section 6.8** of **Chapter 6: Air Quality [APP-048]** and **Section 4.7** of this document has included consideration of $NH_3$ emissions on relevant and sensitive habitat.<br>4) Noted.<br>5) Noted. Operational traffic numbers have been revised since the first Statutory Consultation and therefore this pathway has been scoped into both the impact assessment and HRA (see **Section 4.7** of this document). |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| Natural England | Statutory Consultation January 2023 | Potential air quality impacts from marine vessels during construction phase<br><br>Paragraph 6.8.32 states that although the construction vessel working area is adjacent to the SAC, receptors sensitive to air pollution impacts are not present in the vicinity of the vessels, and the nearest sensitive receptor (saltmarsh) is 3km from the location. Natural England advises that this should be clearly explained within the Shadow HRA. | Air quality sensitive receptors within the SAC that are included in the air quality assessment are illustrated on **Figure 6.3 [APP-080 to APP-083]** and are included in this Shadow HRA as summarised below.<br><br>**Table 3** of this HRA sets out the rationale for excluding construction vessel emissions as a pathway for LSE on the Humber Estuary SPA, and **Table 5** of this HRA for the Humber Estuary Ramsar. In summary, this is because none of the habitats within the zone of influence of the construction vessel working area support vegetation that could be sensitive to vessel emissions (intertidal mudflats and subtidal estuarine habitats). |
| Natural England | Statutory Consultation January 2023 | Potential dust emissions during construction phase.<br><br>We note that at 6.8.7 a 50m buffer for ecological receptors within nature conservation sites has been used. Natural England advises that designated site ecological receptors within 200m should be assessed for potential impacts from dust emissions. However, we agree with paragraph 6.8.19 which states that tidal mudflat has been identified as not being sensitive to dust impacts, therefore we advise that if all ecological receptors within 200m are mudflat then this impact pathway can be screened out. | Noted. The construction dust assessment that has been reported in **Section 6.8** of **Chapter 6: Air Quality [APP-048]** has followed the methodology based on relevant guidance, . Designated habitats within 200m of landside construction activities are intertidal mudflats, which are not sensitive to dust emissions. All other construction activities are greater than 200 m from the designated habitats. |
| Natural England | Statutory Consultation January 2023 | Potential air quality impacts from marine vessel emissions and landside plant emissions during operation phase<br><br>Natural England notes that paragraphs 6.8.38 – 6.1.2 consider the combined emissions from both the marine vessel emissions and the | **Section 6.8** of **Chapter 6: Air Quality [APP-048]** has reported the air quality impact assessment, including the contribution from vessel emissions and landside plant. These |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | landside plant emissions together, it would be useful to understand the contributions from each of these impact pathways, as this will be useful to inform the effectiveness of any mitigation put in place. | sources of emissions are not modelled separately within the air quality modelling.<br>Changes in air quality during construction and operation could not be screened out of LSE for some Humber Estuary SAC/Ramsar habitat features, and therefore have been subject to appropriate assessment within this Shadow HRA (See **Section 4.7**). However, the assessment has not identified any requirements for mitigation. |
| Natural England | Statutory Consultation January 2023 | Paragraph 6.3.21 states that "NO2 and NH3 also contribute to nitrogen deposition, which is another pollutant that is harmful to nature conservation sites. Flares on site will be required to operate in an emergency or during plant start-up to burn off the release of NH3, which will therefore also be a source of NOx emissions". We advise that as well as contributing to N-deposition, the release of NH3 may also lead to direct damage to vegetation, and it is not clear if there is potential for release of unreacted ammonia through this process. | **Chapter 6: Air Quality [APP-048]** (Section 6.8) has set out and considered all emissions sources and pollutants with the potential to contribute to a significant effect, with reference to applicable guidance. This includes NH3 emissions alone, and the contribution of NH3 emissions to N-deposition Paragraphs 6.4.29 and 6.4.33 discuss the sources of nitrogen emissions included within the air quality modelling.<br>Changes in air quality during operation could not be screened out of LSE for some Humber Estuary SAC/Ramsar habitat features, and therefore have been subject to appropriate assessment within this Shadow HRA (see **Section 4.7**). |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| Natural England | Statutory Consultation January 2023 | We note that PEIR Figures 6.3c and 6.3d include the ecological receptors used as part of the air quality assessment, however, we cannot find any explanation of the reasons for picking these receptors and the habitat types represented at each receptor. | The selection of air quality sensitive receptors has been reported in **Section 6.4** of **Chapter 6: Air Quality [APP-048]** and **Appendix 6.B [APP-176]** of the ES. This includes the selection criteria, in line with appropriate guidance.<br>The study area for assessment of air quality effects is 10km for ecologically sensitive sites in respect of onsite point source emissions and vessels in berth.<br>The Air Pollution Information System ("APIS") website has been used to identify habitats within the statutory designated sites (Humber Estuary SAC/Ramsar) that are sensitive to changes in air quality, and to determine the relevant Critical Levels and Critical Loads for each habitat and pollutant to inform the assessment. |
| Natural England | Statutory Consultation January 2023 | The PEIR Figures 6.3c and 6.3d indicate that the process contributions exceed 1% of the environmental benchmarks for annual mean NOx and N-deposition at several of the ecological receptors. There does not appear to be figures for annual mean NH3 and sulphur dioxide. At this stage, the assessment provided is very preliminary and therefore Natural England will review in further detail once we are consulted on the ES and HRA. | Noted. |
| Natural England | Statutory Consultation January 2023 | Natural England notes at paragraph 6.8.45 that it concludes that "the additional predicted contribution from nitrogen emissions from the Project does not result in any exceedance of the Critical Load range for saltmarsh, and it is concluded that there will be no adverse effect on the Humber | Air quality modelling for construction and operational emissions has been undertaken as reported in **Section 6.8** of ES **Chapter 6: Air Quality [APP-048]**. |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | Estuary designated site." However, we consider that detailed ecological justification would be required to understand the reasoning for not using the lower critical load range for upper saltmarsh. This should be based on habitat surveys and frequency of tidal inundation. We would find it useful for the Shadow HRA to refer to the notified habitat features of the SAC. Even using the higher critical load, we note that the process contribution for annual mean NOx is predicted to be 11% of the critical load, at ecological receptor (E11) defined as worst affected. E11 receptor is also adjacent to the Able Marine Energy Compensation site (Cherry Cobb Sands Tidal Exchange/ managed realignment site), which is due to be constructed. Saltmarsh surveys have been undertaken recently as part of this project. | Changes in air quality during construction and operation could not be screened out of LSE for some Humber Estuary SAC/Ramsar habitat features, and therefore have been subject to appropriate assessment within this Shadow HRA.<br><br>Further information has been included within the assessment to justify the relevant critical loads used, and to refer to the notified habitat features of the SAC (see **Section 4.7**). |
| Natural England | Statutory Consultation January 2023 | <u>Assessment of impacts on benthic habitats and species</u><br><br>At this time, Natural England have not fully considered the potential impacts on benthic habitats and species, and we will provide detailed comments on the ES. However, we have some initial comments below. | Noted |
| Natural England | Statutory Consultation January 2023 | <u>Potential effects from permanent direct loss of intertidal and subtidal habitat during construction and operation phases</u><br><br>Natural England notes that the proposed development will result in loss of 0.017 ha of intertidal habitat as a result of the proposed jetty piles. In addition, it is noted that piling activities will result in a direct loss of 0.035 ha of subtidal habitat. Natural England advises that the assessment considers the potential for adverse effects as a result of loss of both intertidal and subtidal habitat. This should include the combined loss of SAC habitat (i.e., Estuaries and Mudflats and sandflats not covered by seawater at low tide) as well as the loss of supporting habitat for SPA bird species.<br><br>Natural England considers that any credible risk of a measurable loss of marine or terrestrial habitat, no matter how small, from within a European | Habitat loss values have been updated to reflect the latest scheme design. The assessment has considered the potential for adverse effects as a result of loss of both intertidal and subtidal habitat including supporting habitat for SPA bird species.<br><br>Noted. Loss of marine and terrestrial habitat from within a European site has been screened-in for further assessment in the |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | site is a 'likely significant effect' and the full significance of its impact on site integrity should be screened-in and further tested by an Appropriate Assessment. It is Natural England's advice that a lasting and irreparable loss of European Site habitat will prevent a conclusion of no adverse effect on site integrity being reached, unless an Appropriate Assessment can clearly demonstrate it is ecologically inconsequential.<br><br>Furthermore, the appropriate assessment should be made in view of the European sites' conservation objectives, which provides a list of attributes contributing to site integrity that can provide a checklist for the assessment process, the detailed supplementary advice and advice on operations should also inform the conclusion. | Appropriate Assessment.<br><br>The Shadow information to support an Appropriate Assessment has been prepared in view of the European sites' conservation objectives which has been used as a basis for the assessment. The supplementary advice and advice on operations has also been used to inform the conclusion. |
| Natural England | Statutory Consultation January 2023 | <u>Assessment of impacts on Sea and River Lamprey (migratory fish) during the construction phase</u><br><br>The following advice is provided on the assumption that the underwater noise modelling used in the assessment in Appendix 9B is correct and we defer to Cefas advice as to the accuracy of the modelling.<br><br>NE note in paragraph 9.8.1, that there are a number of mitigation measures being considered for fish and marine mammals including "the use of soft start procedures, the use of vibro piling where possible with seasonal/night time piling restrictions specifically for migratory fish species and JNCC piling protocols for marine mammals" it also states that these mitigation measures would be further developed, if required, through ongoing engagement with statutory authorities as part of the statutory consultation process and taking into account the final scheme design information and latest understanding of potential effects.<br><br>We agree that the mitigation set out would be effective in reducing impacts to migratory fish and should be considered within the assessment. The | Noted.<br><br>Noted. Mitigation requirements for fish have been developed as part of the assessment process (including the Shadow HRA) and through engagement with statutory authorities (detailed below in table). |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | outcome of the Shadow HRA will identify the mitigation required. We welcome the commitment to engage with Natural England to further develop mitigation measures considering the final design and understanding of potential effects. | |
| Natural England | Statutory Consultation January 2023 | Assessment of impacts on marine mammals during construction and operation phases<br>As above, the following advice is provided on the assumption that the modelling used in the underwater noise assessment in Appendix 9B is correct and we defer to Cefas advice as to the accuracy of the modelling. | Noted |
| | | NE broadly agrees with the scope of the assessment during the construction phase of the project. Nonetheless, we advise that the assessment should reflect the key impact parameters including hammer energy, pile diameter, timing, and duration. An assessment based on these parameters should present the ranges/zones of injury and disturbance to marine mammals. The number of animals predicted to be within the impact zones should be determined and presented as a proportion of the relevant reference population (e.g., Management Unit population for EIA purposes). Note that we consider it likely that marine mammals could be within the construction impact zones, based on their highly mobile nature and the evidence presented by the Application such as the sightings of harbour porpoise approximately 2km from the project area and grey seals are regularly recorded foraging in the Immingham area. Once the risk of exposure is identified, appropriate mitigation should be considered. The outcome of the Shadow HRA will identify the mitigation required. We welcome the commitment to engage with Natural England to further develop mitigation measures considering the final design and understanding of potential effects. | The assessment has been based on the results of the underwater noise modelling and has taken into account factors such as marine piling method, pile diameter, duration. Mitigation has been developed based on an understanding of the population ecology of the marine mammal species in the area. Where possible an estimation of the number of animals predicted to be within the potential zone of effect of marine piling has been determined and presented as a proportion of the relevant reference population (e.g., Management Unit population).<br>Mitigation requirements for marine mammals have been developed as part of the assessment process (including the Shadow HRA) and through engagement with statutory authorities (detailed below in table). |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| Natural England | Statutory Consultation January 2023 | **Chapter 10: Ornithology**<br>**Potential Impacts on Greater Wash SPA**<br>Your assessment concludes that the proposal can be screened out from further stages of assessment because significant effects are unlikely to occur, either alone or in combination. On the basis of the information provided, Natural England concurs with this view. | Noted |
| Natural England | Statutory Consultation January 2023 | **Key points in relation to Humber Estuary SPA/ Ramsar birds**<br>Associated British Ports (ABP) has collected bird data for bird survey Sector C of Immingham frontage for October to March inclusive for several years. In relation to this development, data has been collected for August and September 2021 and April to August 2022. Natural England advises that the data for winter and summer bird counts for 2021 and 2022 should be combined to give a complete picture of bird activity throughout these years. We understand that bird data is being collected for terrestrial fields adjacent to the Humber Estuary to assess their value as functionally linked land.<br>• Once the additional bird data is available, the relevant tables and figures (including figures 10.3 and 10.4 which relate to bird data within bird survey sector C of Immingham frontage) need to be updated so that we have a more complete picture of bird use on the site. Please also indicate clearly the sources of data for each figure/ table, whether it is Wetland Bird Survey (WeBS) or ABP's own data.<br>• Once additional data is available, more detailed assessment of the data is needed, including identification of the months that have significant numbers of SPA/ Ramsar species (over 1% of the latest WeBS five-year mean peak) and identification of the key species. This information is currently presented as data for October to March winter period (Table 10.7) and data for months outside October to March winter period (Table 10.8) | 1). Noted.<br>2). Relevant tables and figures have been updated (including winter 2022/23 data) within **Appendix A and Chapter 10: Ornithology [APP-052]**. The source of the data has been highlighted in the respective tables or figures.<br>3). More detailed assessment based on the data has been undertaken including identifying those months that have numbers of SPA/ Ramsar species (over 1% of the latest estuary-wide WeBS five-year mean peak). |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | • More information about mitigation measures will be required if significant numbers of birds are recorded. The Shadow HRA should also explain how the mitigation measures proposed will avoid or reduce the effect and the level of certainty that mitigation measures will be effective.<br>• The intertidal areas adjacent to proposed jetty and the terrestrial habitat are likely to be the areas with the highest potential for impacts on SPA/Ramsar birds. | 4). Mitigation requirements for coastal waterbirds have been developed based on the bird survey results and as part of the assessment process (including the Shadow HRA) and through engagement with statutory authorities**.**<br>5). Noted |
| Natural England | Statutory Consultation January 2023 | **Natural England's response refers to the following tables:**<br>**Table 10.10 Potential effects during construction scoped in/ out of further detailed assessment**<br>In terms of construction impacts, we consider that this table equates to the likely significant effect test in the Shadow HRA for effects on SPA/ Ramsar birds during the construction period. Natural England agrees that maintenance dredging and dredge disposal is unlikely to impact SPA/ Ramsar birds due to the distance of the berth from any intertidal habitat. The assessment of impacts on SPA/ Ramsar birds during the construction period will be informed by the additional bird data and analysis of this data. Natural England will provide advice on the outputs of the assessments once the additional information is available. | Noted |
| Natural England | Statutory Consultation January 2023 | **Table 10.11 Potential effects during operation scoped in/ out of further detailed assessment (berth operations during operation phase)**<br>The following impacts have been screened in for further assessment and Natural England supports this approach.<br>• Direct changes to intertidal foraging and roosting habitat as a result of marine infrastructure footprint.<br>• Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats. | Noted |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | • Airborne noise and visual disturbance to waterbirds using terrestrial habitats.<br>The assessment of impacts on SPA/ Ramsar birds during the operational period will be informed by the additional bird data and analysis of this data. Natural England will provide advice on the outputs of the assessments once the additional information is available. | |
| Natural England | Statutory Consultation January 2023 | **Table 10.12 Summary of potential impact, mitigation, and residual effects**<br>We cannot comment on this table until all the bird data is available, the Shadow HRA has been carried out and we better understand the expected impacts and what mitigation measures are required. | Noted |
| Natural England | Statutory Consultation January 2023 | Below is a summary of the expected scenarios/ locations for disturbance of SPA/ Ramsar birds during construction and operation phases. We have highlighted any additional issues that we advise should be considered in the assessment:<br>1) Disturbance to birds during construction in the marine environment (Table 10.10)<br>Natural England supports the use of the 300m disturbance zone for birds. Mitigation measures such as soft start piling, and cold weather restrictions have been mentioned. However, the Shadow HRA should look in detail at the impacts of the development on SPA/ Ramsar birds and identify what/why mitigation measures will be required. The Environment Agency has implemented seasonal working restrictions for the Stallingborough 3 flood alleviation scheme (avoiding working during the winter months), so this will be a consideration. | Based on a detailed review (presented **Section 4.10**), the assessment has been based on the application of a 200m disturbance zone rather than 300m as the evidence suggests the response of waterbirds to disturbance stimuli is relatively limited at distances over 200m, particularly in areas subject to already high levels of existing anthropogenic activity (as found in the Port of Immingham area). The assessment has also been based on advice provided by Natural England as part of the consultation for the nearby proposed Immingham Eastern Ro-Ro Terminal ("IERRT") project which stated that '*peak levels below 55 dBA can be regarded as not significant, while peak noise levels approaching 70 dBA and greater are most likely to cause an adverse effect.*' Therefore, |

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| | | | *levels over 65.5 dBA may cause disturbance to SPA birds. Birds may habituate to regular noise below 70 dBA, but irregular above 50 dBA should be avoided*'. It should be noted that noise modelling of marine piling predicts that noise levels will be lower than 70 dBA at distances of more than 200 m away with the use of a noise suppression system and in the range of background noise levels that can occur on the foreshore in the Port of Immingham area. Mitigation requirements for coastal waterbirds have been developed based on the bird survey results and as part of the assessment process (including the Shadow HRA) and through engagement with statutory authorities. |
| Natural England | Statutory Consultation January 2023 | 2) Disturbance to birds during construction in the terrestrial environment (Table 10.10)<br>Currently the assessment only considers the field adjacent to the estuary where the construction compound will be temporarily located. There may be other terrestrial areas which are within the red line boundary which could be used by SPA/ Ramsar birds, so this also requires consideration. It is stated that the flood bank and the Long Strip plantation will provide screening for the construction works in the estuary, which is relevant. However, as tree works are proposed in Long Strip plantation, an assessment is needed to explain whether these works will impact on birds using the adjacent fields (if this field is still being used by birds during the tree works). | There are no areas of terrestrial habitat within or adjacent to the Project boundary that are functionally linked to the Humber Estuary SPA/ Ramsar **(Section 1.4 of Appendix A).** This pathway has therefore been scoped out of the impact assessment and screened out of the Shadow HRA at Task 1 LSE screening (**Table 4**).<br>This pathway is also screened out of the cumulative and in-combination effects assessment. |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| Natural England | Statutory Consultation January 2023 | 3) Disturbance to birds during operation in the marine environment (Table 10.11)<br><br>Most impacts on birds in the marine environment during operation have been screened out and given the distance of the berthing operations for the intertidal area, Natural England agrees with this assessment. However, further information is needed about the impact on birds using the intertidal areas within 300m of the new port infrastructure (jetty). | Noted. Further more detailed information has been provided on bird numbers in proximity to the new port infrastructure in **Section 4.3** |
| Natural England | Statutory Consultation January 2023 | 4) Disturbance to birds during operation in terrestrial environment (Table 10.11)<br><br>The fields adjacent to the estuary where the site compounds will be temporarily located have been scoped into the assessment, this is supported by Natural England. Natural England has based its advice on the fact that the construction compounds will have been removed by the start of the operational phase, however clarity about this and the expected length of the construction period will be important. There may be other fields that will be part of the development that could be used by SPA/ Ramsar birds and should also be included in the assessment.<br><br>It is stated that the flood bank and the Long Strip plantation will both have a screening effect for birds using the fields adjacent to the estuary. However, as works are proposed on the plantation as part of the development, the effect of the tree works on the screening function needs to be considered. | There are no areas of terrestrial habitat within or adjacent to the Project boundary that are functionally linked to the Humber Estuary SPA/ Ramsar **(Section 1.4 of Appendix A).** This pathway has therefore been scoped out of the impact assessment and screened out of the Shadow HRA at Task 1 LSE screening (**Table 4**).<br><br>This pathway is also screened out of the cumulative and in-combination effects assessment. |
| Natural England | Statutory Consultation January 2023 | 5) Loss of supporting marine habitat for SPA/ Ramsar birds (Table 10.10)<br><br>Natural England agrees that the impacts from capital dredge and dredge disposal and indirect effects on estuarine processes can be screened out of further assessment within the ES, but they should be considered in the Shadow HRA. | Stage 1 (Screening) of the Shadow HRA considers capital dredge and dredge disposal. Indirect effects on estuarine processes has been screened in to Stage 2 (Appropriate Assessment) and assessed in **Section 4.5.** |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | Changes to intertidal habitat from berth operation and infrastructure effects have been screened in for further assessment, Natural England supports this approach. The Shadow HRA should consider whether the same numbers and species of SPA/ Ramsar waterbirds are likely to use the site post construction.<br>No mitigation measures have been proposed so far, however the requirement for mitigation measures will be determined through the Shadow HRA process. | Potential changes to waterbird habitat as a result of infrastructure has been screened in to Stage 2 (Appropriate Assessment) and assessed in **Section 4.3**<br>Direct and indirect effects of dredging on supporting habitat for SPA/ Ramsar birds have been screened into the Shadow HRA. |
| Natural England | Statutory Consultation January 2023 | 6) Loss of supporting terrestrial habitat for SPA/ Ramsar birds (Table 10.10)<br>Loss of habitat is screened in for further assessment, which Natural England supports. The bird data that is currently being gathered will inform the detailed assessment. The Shadow HRA should indicate the period over which the terrestrial habitat will be unavailable due to construction compounds and other uses.<br>Natural England has been working with North East Lincolnshire Council and other estuary stakeholders for many years to deliver a strategic approach to mitigation within the South Humber Gateway (for impacts associated with the loss of land functionally linked to the Humber Estuary SPA/Ramsar site). Natural England believes this is the most effective way to mitigate for impacts on functionally linked land. We therefore support the commitment to further discussion with North East Lincolnshire Council with respect to the South Humber Gateway Mitigation scheme.<br>As the proposed development site falls within the South Humber Bank mitigation zone, you should liaise with North East Lincolnshire Council regarding how you should contribute to the strategic approach. This forms a key policy in the North East Lincolnshire local plan (see policy 9 https://www.nelincs.gov.uk/assets/uploads/2020/10/The-NEL-Local-Plan-adopted-2018.pdf) (Ref 1-10) | There are no areas of terrestrial habitat within or adjacent to the Project boundary that are functionally linked to the Humber Estuary SPA/ Ramsar **(Section 1.4 of Appendix A).** This pathway has therefore been scoped out of the impact assessment and screened out of the Shadow HRA at Task 1 LSE screening.<br>As no functionally linked land is present within the Project Boundary, there is no requirement for mitigation to be delivered via the South Humber Gateway Scheme (Policy 9). |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| Natural England | Statutory Consultation January 2023 | **Chapter 25: In-Combination Screening Assessment**<br>The Shadow HRA will need to consider in-combination effects from other relevant projects and plans. The in-combination requirement makes sure that the effects of numerous small proposals, which alone would not result in a significant effect, are assessed to determine whether their combined effect would be significant enough to require more detailed assessment.<br>Plans or projects that should be considered in the in-combination assessment include the following:<br>i. The incomplete or non-implemented parts of plans or projects that have already commenced;<br>ii. Plans or projects given consent or given effect but not yet started;<br>iii. Plans or projects currently subject to an application for consent or proposed to be given effect;<br>iv. Projects that are the subject of an outstanding appeal;<br>v. Ongoing plans or projects that are the subject of regular review;<br>vi. Any draft plans being prepared by any public body;<br>vii. Any proposed plans or projects published for consultation prior to application.<br>Natural England has no specific comments to make on this Chapter but will provide further detailed advice on the in-combination assessments undertaken as part of the Shadow HRA. These will need to consider all of the impact pathways that has been discussed within this letter. | Noted. The Shadow HRA considers in-combination impacts (**Section 4.15**) based on the criteria highlighted by NE. |
| Pre-application meeting, 23 November 2022. | Natural England | The meeting provided an update of the IGET project, a summary of the site-specific surveys and a high-level discussion of potential effects. | The Shadow HRA has been completed taking on board consultee comments from the meeting. |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| Pre-application meeting, 11 January 2023 | Natural England | The meeting provided a further update of the IGET project as well as a discussion on potential effects, HRA, stakeholder engagement and project programme. | The Shadow HRA has been completed taking on board consultee comments from the meeting. |
| Pre-application meeting, 1 August 2023. | Natural England | The meeting provided a further update of the Project as well as a discussion on potential effects, HRA, stakeholder engagement and project programme. | The Shadow HRA has been completed taking on board consultee comments from the meeting. |
| Second Statutory Consultation | Natural England | **Internationally and nationally designated sites**<br><br>Natural England notes there have been no amendments to the PEIR Appendix 9C which was provided in the first S42 consultation.<br><br>The application site is in close proximity to European designated sites (also referred to as Habitat sites), and therefore has the potential to affect their interest features. European sites are afforded protection under the Conservation of Habitats and Species Regulations 2017, as amended (the ‘Habitats Regulations’). The application site is within and adjacent to the Humber Estuary Special Area of Conservation (SAC) and Special Protection Area (SPA) which are European sites. The site is also listed as Humber Estuary Ramsar site and notified at a national level as Humber Estuary Site of Special Scientific Interest (SSSI).<br><br>Our advice regarding the potential impacts upon the Humber Estuary SSSI coincides with our advice regarding potential impacts upon the Humber Estuary SAC/SPA/Ramsar as detailed above. | Potential effects on the Humber Estuary SAC, SPA and Ramsar site are considered in this Shadow HRA report. |

| Consultee | Reference, Date | Summary of Response | How Comments Have been Addressed in this shadow HRA |
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| | | Natural England notes that the application site is in close proximity to the Humber Estuary SSSI and North Killingholme Haven Pits SSSI. Based on the plans submitted, Natural England considers that the proposed development could have potential significant effects on the interest features for which the sites have been notified.<br><br>The consultation documents provide some screening information for the Habitats Regulations Assessment (HRA). It is Natural England's advice that the proposal is not directly connected with or necessary for the management of the European site. You should therefore determine whether the proposal is likely to have a significant effect on any European site, proceeding to the Appropriate Assessment stage where significant effects cannot be ruled out. | |

# 3. Stage 1 - Screening

## 3.1. Identification of Sites and Features screened into the Assessment

3.1.1. In accordance with PINS Advice Note 10 (Ref 1-9), the first stage of the Shadow HRA involves considering if the plan or project is likely to have a significant effect on interest features of a European/Ramsar site either alone or in-combination with other plans or projects.

3.1.2. The entire Humber Estuary is designated as a SAC and a SPA under the Habitats and Birds Directives. It is also classified as a 'Ramsar site' under the Ramsar Convention due to the presence of internationally important wetlands. These designated sites together form the Humber Estuary European Marine Site ("EMS"). In addition, following advice from Natural England (Table 1), there is the potential for the Greater Wash SPA, which is located approximately 20km from the Project, to be affected as it is designated for a range of seabird and diving bird species. The Wash and North Norfolk Coast SAC, which has common seals as a qualifying feature, also has the potential to be affected by the Project. The location of these sites in relation to the Project is shown on **Plate 2** of this Shadow HRA.

3.1.3. The qualifying interest features and justification as to their inclusion or exclusion from the Stage 1 screening assessment is provided in Table 2. The judgement as to whether a site or feature needs to be considered is based on the available baseline information of the location, ecology and/or behaviour of interest features provided in **Appendix A** and the detailed description of the Project provided in **Chapter 2: The Project of the ES [REP3-022]**. In the specific context of SPA/Ramsar waterbird features, advice provided by Natural England that birds exceeding 1 % of the estuary-wide WeBS five-year mean peak should be viewed as significant numbers has also been applied. This is a threshold commonly applied by Natural England on the Humber Estuary, and one which has been specifically requested by Natural England to be applied for the Project, to determine whether there is the potential to adversely effect individual species. Some species were also screened in on a precautionary basis when numbers were lower than 1 % of the estuary wide populations but they were considered to be regularly recorded in this area.

3.1.4. The potential impacts that could result in LSE on features of the Humber Estuary SAC, SPA and Ramsar alone and in-combination are considered in Table 3**,** Table 4 and Table 5 respectively. The potential impacts that could result in LSE on the Wash and North Norfolk Coast SAC are also considered in Table 3. It should be noted that when screening in potential impacts in the tables for LSE, a highly precautionary approach has been taken. On this basis, potential effects considered alone have only been screened out of Stage 2 (Appropriate Assessment) when there is a high degree of confidence (and no reasonable scientific doubt) that a pathway will not result in a LSE (i.e. negligible and ecologically inconsequential effects with no risk of causing an AEOI). It therefore follows that for these pathways, in-combination effects will also not be of a magnitude that will require consideration at Stage 2 (Appropriate Assessment) as the relative contribution of the IGET project to any additive or synergistic effects as a result of several projects acting in-combination will also be negligible. Where there is considered to be any risk or uncertainty with respect to a pathway having the potential to result in a LSE either alone or in-combination, these effects have been taken forward to Stage 2 (Appropriate Assessment).

## Plate 2: Location of designated sites

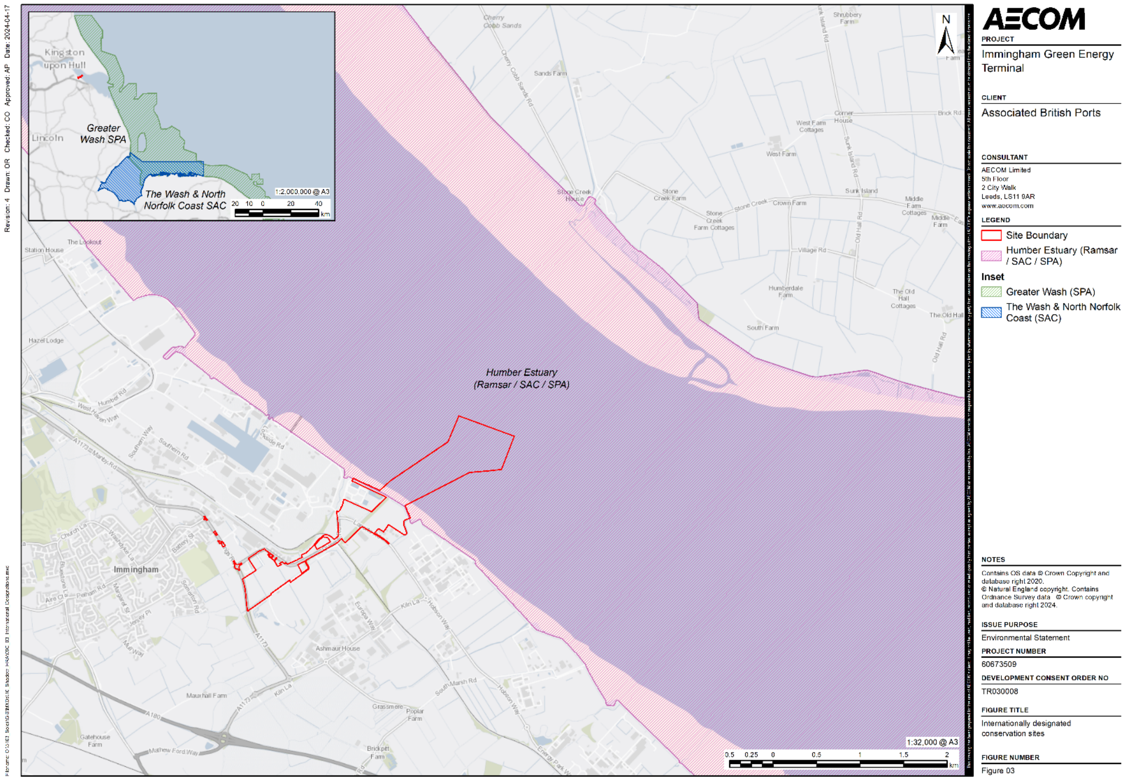

**Table 2: Identification of European/Ramsar sites and qualifying features relevant to the Screening assessment**

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| Humber Estuary SAC | H1110. Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks | ✓ | Feature is present in the vicinity of the dredge disposal site. |
| | H1130. Estuaries | ✓ | Feature is present within the footprint of the Project. |
| | H1140. Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats | ✓ | Feature is present within the footprint of the Project. |
| | H1150. Coastal lagoons | x | Two qualifying coastal lagoons areas are present within the Humber Estuary SAC boundary (Humberston Fitties and Northcoates Lagoon which are located over 15km and 20km respectively from the proposed Project). These sites lie beyond the area likely to be subject to any potential direct or indirect changes resulting from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham. |
| | H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | ✓ | Based on the current geographic extent and location of Natural Environment and Rural Communities Act (2006) Section 41 habitats of principal importance (Ref 1-11) the nearest saltmarsh habitat is located over 3km to the northwest of the Project at Killingholme within the Humber Estuary Site of Special Scientific Interest ("SSSI") Unit 093 – HIT to Second Jetty. This is outside any potential direct or indirect marine changes resulting from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham. However pioneer saltmarsh is moderately sensitive to N deposition or NOx/ammonia from operational marine vessel/road vehicle emissions and requires consideration in relation to this pathway only. |
| | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | ✓ | As described above the nearest saltmarsh habitat is located approximately 3km to the northeast of the Project and outside of any potential direct or indirect marine changes resulting from the construction and operational activities. However Atlantic salt meadows |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | | | (*Glauco-Puccinellietalia maritimae*) is sensitive to N deposition or NOx/ammonia from operational marine vessel/road vehicle emissions and requires consideration in relation to this pathway only. |
| | H2110. Embryonic shifting dunes | x | Based on the current geographic extent and location of Natural Environment and Rural Communities Act (2006) Section 41 habitats of principal importance (Ref 1-11), the nearest coastal sand dunes within the Humber SAC are located more than 12km southwest of the Project at Cleethorpes and therefore outside the 10km study area for the air quality impact assessment . This is outside any potential direct or indirect changes resulting from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham. |
| | H2120. Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); Shifting dunes with<br><br>Marram | x | |
| | H2130. Fixed dunes with herbaceous vegetation ("grey dunes"); Dune grassland | x | |
| | H2160. Dunes with *Hippophae rhamnoides*; Dunes with sea-buckthorn | x | |
| | S1095. *Petromyzon marinus*; Sea lamprey | ✓ | Sea lamprey are recorded in the estuary and are known to also move through the estuary during spawning migrations (as summarised in **Section 1.3 of Appendix A**). This species may be present in the vicinity of the Project. |
| | S1099. *Lampetra fluviatilis*; River lamprey | ✓ | River lamprey are recorded in the estuary and are known to also move through the estuary during spawning migrations (as summarised in **Section 1.3 of Appendix A**). Their growth phase is primarily restricted to estuarine waters. This species may be present in the vicinity of the Project. |
| | S1364. *Halichoerus grypus*; Grey seal | ✓ | The nearest established breeding colony for grey seals is located over 25km away at Donna Nook. In addition, small numbers have been observed hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary) which is located approximately 4km north east |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | | | from the Project and around 3-4km from the dredge disposal site (including transit routes). Whilst not sensitive at their haul out sites, grey seals may be present in the estuary in the vicinity of the Port of Immingham. |
| Humber Estuary SPA | A021 *Botaurus stellaris*; Great Bittern (Non-breeding) | x | The Humber region supports both breeding and wintering Great Bittern. Based on the extensive bird data available for the Humber Estuary, Great Bittern is recorded within reedbed habitats such as around Blacktoft Sands, Far Ings and North Killingholme Haven clay pits. This species does not normally occur on open mudflat habitat and has not been recorded in the Immingham Outer Harbour ("IOH") bird monitoring that has been undertaken in the Immingham area (**Section 1.4 of Appendix A**). |
| | A021 *Botaurus stellaris*; Great Bittern (Breeding) | x | |
| | A048 *Tadorna tadorna*; Common Shelduck (Non-breeding) | ✓ | Low numbers (< 10-20 individuals feeding during the winter months and <10 individuals feeding outside the winter months and roosting year-round), representing < 1% of the estuary wide WeBS five year mean peak) have been recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C between the Immingham Oil Terminal ("IOT") Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project) (**Section 1.4 of Appendix A**). While this species has only been recorded in relatively low numbers in the context of estuary-wide populations (and below the 1 % threshold used by Natural England to determine potentially significant numbers), given this species is regularly recorded, the feature has been screened in on a precautionary basis. |
| | A081 *Circus aeruginosus*; Eurasian Marsh Harrier (Breeding) | x | Marsh Harriers breed in the Humber region and are also recorded during passage periods and the winter. Marsh Harrier primarily forage around reed beds and marshes in coastal areas as well as farmland near wetland and are recorded relatively frequently in the Immingham region. However, the species is not recorded hunting over mudflats for prey species and, therefore, does not overlap with any potential direct or indirect changes resulting from the construction and operational activities associated with the Project, which are limited to within the vicinity of the Port of Immingham |
| | A082 *Circus cyaneus*; Hen Harrier (Non-breeding) | x | Hen Harrier is a winter visitor and passage migrant on the Humber. This species roosts and forages primarily in areas of saltmarsh and reedbed as well as open habitats such as arable fields and grassland. This species is only rarely recorded in the Immingham area. |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | A132 *Recurvirostra avosetta*; Pied Avocet (Non-breeding) | x | Wintering populations of Pied Avocet are typically recorded in the inner estuary in the largest numbers (**Section 1.4 of Appendix A**). This species is recorded in the Immingham region but is considered rare in the vicinity of the Project with no Avocet recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project). The area is, therefore, considered to be of very limited functional value for the species and has been screened out. |
| | A132 *Recurvirostra avosetta*; Pied Avocet (Breeding) | x | Pied Avocet are not known to breed on the foreshore in the Immingham area. This species is recorded in the Immingham region but is considered rare in the vicinity of the Project with no Avocet recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project). The area is, therefore, considered to be of very limited functional value for the species and has been screened out. |
| | A140 *Pluvialis apricaria*; European Golden Plover (Non-breeding) | x | The Humber Estuary is one of the most important sites in the UK for Golden Plover with the species primary recorded roosting on mudflats and other intertidal habitats in the region (**Section 1.4 of Appendix A**). While this species is widely distributed through the estuary, the species is considered rare in the vicinity of the Project with no Golden Plover recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project). The area is, therefore, considered to be of very limited functional value for the species and has been screened out. |
| | A143 *Calidris canutus*; Red Knot (Non-breeding) | x | While this species is recorded on the foreshore in the Immingham area, the species is considered rare in the vicinity of the Project with no Knot recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project). The area is, therefore, considered to be of very limited functional value for the species and has been screened out. |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | A149 *Calidris alpina*; Dunlin (Non-breeding) | ✓ | Low numbers (<100 individuals feeding during the winter months and <10 individuals feeding outside the winter months and roosting year-round) representing < 1% of the estuary wide WeBS five year mean peak) have been regularly recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project) (**Section 1.4 of Appendix A**). While this species has only been recorded in low numbers in the context of estuary-wide populations (and below the 1 % threshold used by Natural England to determine potentially significant numbers), given this species is regularly recorded, the feature has been screened in on a precautionary basis. |
| | A151 *Philomachus pugnax*; Ruff (Non-breeding) | x | The Humber Estuary is considered an important site for passage Ruff. Important areas of the Humber for Ruff are the intertidal mudflats and adjacent lagoons of Alkborough Flats and Blacktoft Sand (**Section 1.4 of Appendix A). ** This species is more rarely recorded in the outer Humber Estuary and typically shows a preference for more sheltered sections of the inner Humber Estuary. This species is rarely recorded on mudflat habitat in the Immingham area with no records of the species occurring in Sector C over the last five years of IOH monitoring (2018/19 to 2022/23). |
| | A156 *Limosa limosa islandica*; Black-tailed godwit (Non-breeding) | ✓ | Black-tailed Godwit have been regularly observed on the foreshore in the area of the Project with abundances < 100 individuals recorded feeding (representing up to 2% of the estuary wide WeBS five year mean peak) in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project) (**Section 1.4 of Appendix A**). On this basis, this feature has been screened into the assessment. Numbers recorded feeding outside the winter months and roosting (year-round) have been lower than recorded feeding in the winter months (<10 individuals) representing < 1% of the estuary wide WeBS five year mean peak). |
| | A157 *Limosa lapponica*; Bar-tailed Godwit (Non-breeding) | x | Very low numbers (< 5 individuals, representing < 1% of the estuary wide WeBS five year mean peak) have been recorded relatively infrequently in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 of the Project) |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | | | (**Section 1.4 of Appendix A**). The area is, therefore, considered to be of very limited functional value for the species and has been screened out. |
| | A162 *Tringa totanus*; Common Redshank (Non-breeding) | ✓ | Low numbers (<10-20 individuals feeding during the winter months and <5-10 individuals feeding outside the winter months and <10 individual roosting) representing < 1% of the estuary wide WeBS five year mean peak) have been regularly recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project) (**Section 1.4 of Appendix A**). While this species has only been recorded in low numbers in the context of estuary-wide populations (and below the 1 % threshold used by Natural England to determine potentially significant numbers), given this species is regularly recorded, the feature has been screened in on a precautionary basis. |
| | A195 *Sterna albifrons*; Little Tern (Breeding) | x | Little Tern breed at Easington Lagoon, which is located approximately 20km from the Project, with data suggesting this species forages within 5km of nesting sites (Ref 1-12). This species is considered very rare within the Immingham area. |
| | Waterbird assemblage | ✓ | As well as the qualifying species listed above in this table, the foreshore in the vicinity of the Project also supports a range of other assemblage species with the following bird species regularly recorded in in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project) (**Section 1.4 of Appendix A**):<br>• Turnstone: <20-30 birds feeding and roosting year-round (representing up to 10% of the estuary wide WeBS five year mean peak);<br>• Teal: <20-30 birds feeding during the winter months, <5-10 individuals feeding outside the winter months and <10 individual roosting (representing <1% of the estuary wide WeBS five year mean peak);<br>• Curlew: <10-20 birds feeding during the winter months and <5-10 individuals feeding outside the winter months and <10 individual roosting (representing <1% of the estuary wide WeBS five year mean peak); and |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | | | • Oystercatcher: <10-20 birds feeding during the winter months, <5-10 individuals feeding outside the winter months and <10 individual roosting representing <1% of the estuary wide WeBS five-year mean peak).<br>All these species have been screened into the assessment (noting with specific respect to Teal, Oystercatcher and Curlew that it is acknowledged that they have only been recorded in low numbers in the context of estuary-wide populations (and below the 1 % threshold used by Natural England to determine potentially significant numbers), but given these species are regularly recorded, they have been screened in on a precautionary basis). All other assemblage species have been screened out as they are considered rare or only occur infrequently and in low numbers in this area (representing <1% of the estuary wide WeBS five year mean peak). The rationale for screening in individual assemblage species is provided in **Appendix B** of this HRA. |
| Humber Estuary Ramsar | Criterion 1 – natural wetland habitats that are of international importance: Near-natural estuary with component habitats, specifically dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | ✓ | The Criterion 1 interest feature includes habitats which are present within the footprint of the Project (estuarine waters, intertidal mud and sandflats) and saltmarsh which is sensitive to N deposition or NOx/ammonia from operational marine vessel/ road vehicle emissions. |
| | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>Breeding colony of grey seals *Halichoerus grypus* at Donna Nook. | ✓ | The nearest established breeding colony for grey seals is located over 25km away at Donna Nook. In addition, small numbers have been observed hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary) which is located approximately 4km north east from the Project and around 3-4 m from the dredge disposal site (including transit routes). Whilst not sensitive at their haul out sites, grey seals may be present in the estuary in the vicinity of the Port of Immingham. |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl. | ✓ | As well as the qualifying species listed above in this table, the foreshore in the vicinity of the Project also supports a range of other assemblage species with the following bird species regularly recorded in in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project) (**Section 1.4 of Appendix A**):<br><br>• Turnstone: <20-30 birds feeding and roosting year-round (representing up to 10% of the estuary wide WeBS five year mean peak);<br>• Teal: <20-30 birds feeding during the winter months, <5-10 individuals feeding outside the winter months and <10 individual roosting (representing <1% of the estuary wide WeBS five year mean peak);<br>• Curlew: <10-20 birds feeding during the winter months and <5-10 individuals feeding outside the winter months and <10 individual roosting (representing <1% of the estuary wide WeBS five year mean peak); and<br>• Oystercatcher: <10-20 birds feeding during the winter months, <5-10 individuals feeding outside the winter months and <10 individual roosting (representing <1% of the estuary wide WeBS five year mean peak).<br><br>All these species have been screened into the assessment (noting with specific respect to Teal, Oystercatcher and Curlew that it is acknowledged that they have only been recorded in low numbers in the context of estuary-wide populations (and below the 1 % threshold used by Natural England to determine potentially significant numbers), but given these species are regularly recorded, they have been screened in on a precautionary basis). All other assemblage species have been screened out as they are considered rare or only occur infrequently and in low numbers in this area (representing <1% of the estuary wide WeBS five year mean peak). The rationale for screening in individual assemblage species is provided in **Appendix B** of this Shadow HRA. |
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: | ✓ | Species that form part of Criterion 6 of the Humber Ramsar site, specifically Dunlin, Black-tailed Godwit, Redshank and Shelduck have been screened into the assessment. The |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering). | | rationale for screening in individual species can be seen above in the Humber Estuary SPA section of this table. |
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>River lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus*. | ✓ | River and sea lamprey are recorded in the estuary and are known to also move through the estuary during spawning migrations (as summarised in **Section 1.3 of Appendix A).** River lamprey growth phase is primarily restricted to estuarine waters. This species may be present in the vicinity of the Project. |
| Greater Wash SPA | A001 *Gavia stellata*; Red-throated Diver (Non-breeding) | **x** | The Humber Estuary supports relatively low numbers of wintering Red-throated Diver although it is acknowledged these could form part of the population occurring in the Greater Wash SPA. However, data suggests that Red-throated Diver are rarely recorded inshore in the Port of Immingham area with this species considered to be highly sensitive to vessel movements and typically avoid areas with high shipping intensity (Ref 1-13). On that basis, it is considered that this interest feature of the Greater Wash SPA will not overlap with any potential direct or indirect changes resulting from the construction and operational activities associated with the proposed development which are limited to within the vicinity of the Port of Immingham. |
| | A065 *Melanitta nigra*; Common Scoter (Non-breeding) | **x** | The Humber Estuary supports passage and wintering Common Scoter and it is acknowledged these could form part of the population occurring in the Greater Wash SPA. However, data suggests that Common Scoter are rarely recorded inshore in the Port of Immingham area with this species considered to be highly sensitive to vessel movements and typically avoid areas with high shipping intensity (Ref 1-13). Therefore, this interest feature of the Greater Wash SPA will not overlap with any potential direct or indirect changes resulting |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | | | from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham. |
| | A177 *Hydrocoloeus minutus*; Little Gull (Non-breeding) | x | Little Gull are rarely recorded in the Port of Immingham area (Ref 1-13) and, therefore, this interest feature of the Greater Wash SPA will not overlap with any potential direct or indirect changes resulting from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham. |
| | A191 *Sterna sandvicensis*; Sandwich Tern (Breeding) | x | The Humber Estuary does not overlap with the foraging ranges of nesting Sandwich Terns from the breeding colonies of the Greater Wash SPA (the maximum foraging range of Sandwich Tern recorded is 80km with the breeding colonies located over 90km away on the North Norfolk coast). Most foraging activity also occurs much closer to the nesting colonies (Ref 1-12; Ref 1-13). Therefore, it is highly unlikely this interest feature will overlap with any potential direct or indirect changes resulting from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham |
| | A193 *Sterna hirundo*; Common Tern (Breeding) | x | The Humber Estuary does not overlap with the foraging ranges of nesting Common Terns from the breeding colonies of the Greater Wash SPA (the maximum foraging range of Common Tern recorded is 30km with the breeding colonies located over 90km away on the North Norfolk coast). Most foraging activity also occurs much closer to the nesting colonies (Ref 1-12; Ref 1-13). Therefore, it is highly unlikely this interest feature will overlap with any potential direct or indirect changes resulting from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham. |
| | A195 *Sternula albifrons*; Little Tern (Breeding) | x | Little Tern forages within 5km of nesting sites (Ref 1-14) and, therefore, this interest feature of the Greater Wash SPA will not overlap with any potential direct or indirect changes resulting from the construction and operational activities associated with the Project which are limited to within the vicinity of the Port of Immingham. |
| The Wash and North Norfolk Coast SAC* | S1365 Harbour seal *Phoca vitulina** | ✓ | It is acknowledged that there could be potentially connectivity between the Wash and North Norfolk Coast SAC and the Humber Estuary with respect to common seal movements. Common seals have been recorded foraging over 200km from haul out sites outs including from sites in the Wash (Ref 1-15; Ref 1-16; Ref 1-17). The Wash and North Norfolk Coast |

| Site | Qualifying features | Justification (✓ requires consideration, x not relevant to the screening assessment) | |
|---|---|---|---|
| | | | SAC is located over 75km from the Project. However, evidence suggest that harbour seals typically forage within 40-50km of their haul out sites (Ref 1-18) which is reflected in high predicted at-sea densities of common seals in the Wash and along the North Norfolk and Lincolnshire coasts and much lower predicted densities in the Humber Estuary or north of Spurn Point (Ref 1-19). On this basis, the Immingham area is not considered to be key foraging habitat for common seals of the Wash and North Norfolk Coast SAC population although it is acknowledged that it is possible that individuals from this population could infrequently forage in this area. |
| • The Wash and North Norfolk Coast SAC also supports a range intertidal and subtidal qualifying habitat features but given that these features are located over 75km from the Project they are not within the zone of influence of potential effects and therefore has no potential to cause LSE. | | | |

**Table 3: Potential impacts that could result in LSE on features of the Humber Estuary SAC and the Wash and North Norfolk Coast SAC**

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| Humber Estuary SAC | Construction | Direct loss of qualifying intertidal habitat | Marine piling | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries | Yes | Marine piling will result in the small loss of intertidal. |
| | | Direct loss of qualifying subtidal habitat | Marine piling | H1130: Estuaries | Yes | Marine piling will result in the small loss of subtidal. |
| | | Changes to qualifying habitats as result of the removal of seabed material during capital dredging | Capital dredge | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries | Yes | Capital dredging causes the direct physical removal of marine sediments from the dredge footprint, resulting in the modification of existing marine habitats. The impacts to benthic fauna associated with the dredged material include changes to abundance and distribution through damage, mortality or relocation to a disposal site. |
| | | Direct changes to qualifying habitats as a result of sediment deposition | Marine piling | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries | No | Marine piling has the potential to result in the localised resuspension of sediment as a result of seabed disturbance. Sediment that settles out of suspension back onto the seabed as result of marine piling is expected to be negligible and benthic habitats and species are not expected to be sensitive to this level of change. This |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE |
| | | | Capital dredge | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries | Yes | Capital dredging has the potential to result in localised physical disturbance and smothering of seabed habitats and species (where the sediment settles out of suspension back onto the seabed). |
| | | | Dredge disposal | H1110. Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries | Yes | Dredge disposal will result in the deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats. |
| | | Indirect loss or change to qualifying habitats as a result of changes to hydrodynamic and sedimentary processes | Marine works (jetty structure and capital dredging) | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries | Yes | The jetty structure and capital dredge have the potential to result in changes to hydrodynamic and sedimentary processes (e.g., flow rates, accretion and erosion patterns). Marine invertebrates inhabiting sand and mud habitat show different tolerance ranges to physiological stresses caused by tidal exposure and tidal elevation and, therefore, hydrodynamic and bathymetric changes caused by the dredging could affect the quality of marine habitats and change the distribution of marine species. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | Dredge disposal | H1110. Sandbanks which are slightly covered by sea water all the time<br><br>H1130: Estuaries | Yes | The disposal of dredged material at the marine disposal site has the potential to result in changes to hydrodynamic and sedimentary processes (e.g., water levels, flow rates, changes to tidal prism, accretion and erosion patterns). Marine invertebrates inhabiting sand and mud habitat show different tolerance ranges to physiological stresses caused by tidal exposure and tidal elevation and, therefore, hydrodynamic and bathymetric changes caused by the disposal could affect the quality of marine habitats and change the distribution of marine species. |
| | | Changes in water and sediment quality on benthic habitats and species | Marine piling | H1140: Mudflats and sandflats not covered by seawater at low tide<br><br>H1130: Estuaries | No | The negligible, highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) associated with bed disturbance during marine piling is considered will not result in significant effects in any species and habitats. The potential for accidental spillages will also be negligible during construction through following established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | are considered to be negligible and not of a magnitude to cause a LSE. |
| | | | Capital dredge | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries | Yes | Changes in water quality during capital dredging could impact benthic habitats and species through an increase in suspended sediment concentrations ("SSC") and the release of toxic contaminants bound in sediments. |
| | | | Dredge disposal | H1110. Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries | Yes | Changes in water quality could occur during dredged material disposal through the deposition of material causing elevated SSC and contaminant levels. This could potentially impact on benthic habitats and species. |
| | | | Surface water drainage | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1110. Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries | No | Standard measures to control surface water run-off during construction are embedded within the Project design to ensure legislative compliance, and therefore it is very unlikely that contaminated run-off would enter the Humber Estuary. This impact pathway is therefore, not considered further in the Shadow HRA. |
| | | The potential introduction and | Construction, dredging and dredge disposal | H1140: Mudflats and sandflats not covered by seawater at low tide | Yes | Non-native species have the potential to be transported into the local area as a result of construction, dredging and dredge disposal activity. Potential effects alone are |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | spread of non-native species | | H1130: Estuaries<br><br>H1110. Sandbanks which are slightly covered by sea water all the time | | considered in Section 4.12 although in-combination effects are assumed to be negligible and not of a magnitude to cause a LSE assuming that standard biosecurity measures are implemented for the Project and also for other projects. |
| | | Physical change to habitats resulting from the deposition of airborne pollutants | Construction marine vessel and road vehicle emissions | H1140: Mudflats and sandflats not covered by seawater at low tide<br><br>H1130: Estuaries<br><br>H1110. Sandbanks which are slightly covered by sea water all the time<br><br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand<br><br>H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | No | The assessment has considered a scenario of peak construction vessel operation (see **Chapter 6: Air Quality** of the ES **[APP-048]).** Given the limited number of construction vessel emissions sources, the frequency of operation and distance between source and sensitive receptors (over 3km away from the nearest saltmarsh habitat), it is considered highly unlikely that this source could contribute to a significant effect on local air quality. Transport emissions have a much smaller dispersal distance than energy from waste facilities and other significant emitters for which a 10km zone of influence would be more appropriate. While the zone of influence for ship exhaust stacks will be greater than that for vehicle exhausts (where the zone of influence is 200m) this has been allowed for in the precautionary use of a 3km zone of influence.<br><br>That this is a precautionary distance is indicated by guidance from Defra on the |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | zone of influence of vessel emissions in their Local Air Quality Management Technical Guidance[2]. That guidance requires local authorities to consider emissions from vessels for the purpose of Local Air Quality Management only where there is relevant exposure within either 250m or 1km of the berths and main areas of manoeuvring, subject to the number of "large ship movements". The construction vessels to be utilised for the construction of the IGET project do not fall under the definition provided in the LAQM TG(22) guidance for large ships. Smaller construction vessels with less weight will not require the same energy demand as large ships and will therefore have lower emissions.<br><br>The SAC habitats closest to the construction site are intertidal habitats and are therefore not sensitive to changes in air quality due to dust smothering or marine vessel/ road vehicle emissions during construction. Although there are areas of designated habitat within the Humber Estuary SAC that are nearer to the source of vessel emissions, these are intertidal |

2 UK Regions (exc. London) Technical Guidance | LAQM (defra.gov.uk)

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | mudflats (H1140) and subtidal estuarine habitats (H1130, H1110) that do not support any rooted plants that could be sensitive to construction vessel emissions.<br><br>All available critical loads (and levels) are based on research into impacts on 'rooted macrophytes' (i.e. conventional plants) or (for ammonia) lichens & bryophytes. In other words, they have all been based on impacts on plant communities which obtain their nutrients either through their roots or directly from atmosphere. Unvegetated intertidal mudflat has no such vegetation communities and therefore it would be completely inappropriate to use the available critical loads.<br><br>While intertidal mudflats supporting pioneer saltmarsh (H1310) can be sensitive to nutrients in some circumstances, where they cause excessive macroalgal (seaweed) growth, the APIS notes that even for saltmarsh *'Overall N deposition [from atmosphere] is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs'*. It is also considered that the Humber Estuary is likely to be at relatively low risk of smothering from macroalgae, given the role of high sediment load in |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | limiting sunlight penetration and strong wave action in breaking up macroalgae mats.<br><br>The nearest saltmarsh habitat (H1330) is approximately 3km north-east of the site. The assessment has concluded that due to the transient, intermittent and temporary nature of construction marine vessel emissions, and the distance from the nearest sensitive habitat, there will be no likely significant effects on SAC habitats (see **Chapter 9: Nature Conservation (Marine Ecology) [APP-051]**).<br><br>There are no European sites within 200m of a road that will be used by project traffic (see **Chapter 6: Air Quality** of the ES **[APP-048]**). There are therefore no roads that exceed the National Highways DMRB screening criteria on the Strategic Road Network (see **Chapter 6: Air Quality** of the ES **[APP-048]**). There is therefore no potential for construction road vehicle emissions to give rise to LSEs on designated habitats. This impact pathway is, therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | Direct loss or changes to migratory fish habitat | Marine piling | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | No | There is the potential for impacts to fish as a result of habitat loss due to installation of piles and the footprint of the Project. However, the direct footprint of the marine piling only covers a highly localised area with the mobile nature of lamprey allowing them to utilise nearby areas. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | | Capital dredge | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | No | Backhoe dredging can directly remove fish and fish eggs in the bucket. Capital dredging also has the potential to result in seabed disturbance and smothering of seabed habitats and species. However, the capital dredge will not overlap with the spawning grounds of lamprey which are further upstream in freshwater habitat. Both species are recorded in the estuary at other life stages with the growth phase of river lamprey primarily restricted to estuaries and both species also move through the estuary during spawning migrations. Given the very small dredge footprint in the context of the entire Humber Estuary (and small amount of material that needs to be dredged), the probability that |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | lamprey species will be removed into the bucket during backhoe dredging while passing through the estuary on migration is considered to be low. In addition, given the high mobility of both river and sea lamprey, lamprey will easily be able to avoid the zone of influence of the dredging and utilise other nearby areas with the footprint of dredging only representing a small proportion of the ranges of lamprey. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | | Dredge disposal | S1095: Sea lamprey *Petromyzon marinus*<br><br>S1099: River lamprey *Lampetra fluviatilis* | No | Disposal at the marine disposal site will result in the deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats. However, the capital dredge will not overlap with the spawning grounds of lamprey which are further upstream in freshwater habitat. Both species are recorded in the estuary at other life stages with the growth phase of river lamprey primarily restricted to estuaries and both species also move through the estuary during spawning migrations. Therefore, given the high mobility of both river and sea lamprey (and also the parasitic fish |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | prey of these species), lamprey will easily be able to avoid the zone of influence of the dredging and utilise other nearby areas with the footprint of dredging only represent a small proportion of the ranges of lamprey. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Changes in water and sediment quality on migratory fish species | Marine piling | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | No | The expected highly localised and temporary changes in suspended sediment levels and related changes in sediment bound contaminants and dissolved oxygen associated with bed disturbance during marine piling will not result in significant effects in any fish species. The potential for accidental spillages will also be negligible during construction through following established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | Capital dredge | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | Yes | Changes in water quality during capital dredging could impact migratory fish species through an increase in SSC and the release of toxic contaminants bound in sediments. |
| | | | Dredge disposal | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | Yes | Changes in water quality could occur during dredged material disposal through the deposition of material causing elevated SSC and contaminant levels. This could potentially impact on migratory fish species. |
| | | Underwater noise effects on migratory fish species | Marine piling | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | Yes | During marine piling, there is the potential for noise disturbance to fish. Percussive (impact) and vibro marine piling will produce underwater noise above background conditions and at a level that may cause a risk of injury and behavioural changes to migratory fish in the vicinity of the Project. |
| | | | Capital dredge | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | Yes | Elevated underwater noise and vibration levels caused by the action of the dredger could potentially affect migratory fish. |
| | | | Dredge disposal | S1095: Sea lamprey *Petromyzon marinus* | Yes | Underwater noise and vibration levels caused by the movement of the dredger to |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | S1099: River lamprey *Lampetra fluviatilis* | | and from the disposal site could potentially affect migratory fish. |
| | | Lighting effects on migratory fish and seals | Construction | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis*<br>S1364: Grey seal *Halichoerus grypus* | No | With respect to potential lighting effects during construction, equipment such as marine piling rigs, cranes etc. will be lit for safety reasons.<br>Beams of light from construction lighting will largely be restricted to the surface waters as light is unlikely to penetrate far into the water column given the high turbidity of the Humber Estuary. Furthermore, evidence suggests that lamprey are not considered to be particularly sensitive to lighting and will often be attracted to lighting rather than causing a barrier to movements (Ref 1-20 and Ref 1-21. Therefore, such localised changes would not cause disruption or blocking of migratory routes for these species. Seals are also known to forage in areas with artificial lighting (such as harbours, offshore wind farms and fish farms) with lighting not known to cause adverse effects in this species. Rather than disrupting any foraging movements, lighting might also have some minor and localised beneficial effects given that lighting has been shown to aggregate fish shoals and will also potentially improve |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | foraging efficiency through enhancing vision of this predator near the surface. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Direct loss or changes in marine mammal foraging habitat | Construction (marine piling, capital dredge and dredge disposal) | S1364: Grey seal *Halichoerus grypus* | No | There is the potential for impacts to marine mammals as a result of changes to marine mammal foraging habitat and prey resources. However, the footprint of the Project only covers a highly localised area that constitutes a negligible fraction of the known ranges of local marine mammal populations. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Changes in water and sediment quality on marine mammals | Marine piling | S1364: Grey seal *Halichoerus grypus* | No | The negligible, highly localised and temporary changes in suspended sediment levels and related changes in sediment bound contaminants and dissolved oxygen associated with bed disturbance during marine piling will not result in significant effects in any marine mammal species. The potential for accidental spillages will also be negligible during construction |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | through following established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | | Capital dredge | S1364: Grey seal *Halichoerus grypus* | No | The plumes resulting from dredging are expected to have a minimal and local effect on SSC in the vicinity of the Project (as described in more detail in **Chapter 16: Physical Processes [APP-058]**). Marine mammals are well adapted to turbid conditions and, therefore, not sensitive to the scale of changes in SSC predicted during capital dredging (Ref 1-22). Given the limited extent of sediment dispersal significant elevations in water column contamination are unlikely. In addition, the temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub-lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Ref 1-22). Furthermore, potential for accidental spillages will also be negligible during all |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | phases through the application of established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | | Dredge disposal | S1364: Grey seal *Halichoerus grypus* | No | The plumes resulting from dredge disposal are expected to have a minimal and local effect on SSC (as described in more detail in **Chapter 16: Physical Processes [APP-058]**). Marine mammals are well adapted to turbid conditions and, therefore, not sensitive to the scale of changes in SSC predicted during disposal (Ref 1-22). Given the limited extent of sediment dispersal significant elevations in water column contamination are unlikely. In addition, the temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub-lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Ref 1-22). Furthermore, potential for accidental spillages will also be negligible during |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | construction through the application of established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Collision risk to marine mammals | Construction, dredging and dredge disposal | S1364: Grey seal *Halichoerus grypus* | No | Vessels involved in construction and dredging/dredge disposal will be mainly stationary or travelling at low speeds (2-6 knots), making the risk of collision very low. Although all types of vessels may collide with marine mammals, vessels traveling at speeds over ten knots are considered to have a much higher probability of causing lethal injury (Ref 1-23). Furthermore, the region is already characterised by heavy shipping traffic. The additional movements due to construction activity (including capital dredging) will only constitute a small increase in vessel traffic in the area which will also be temporary in nature.<br><br>In general, incidents of mortality or injury of marine mammals caused by vessels remain a relatively rare occurrence in UK waters (Ref 1-24; Ref 1-25). For example, out of 144 post mortem examinations carried out on cetaceans in 2018, only two |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | (1.4%) were attributed to boat collision with the biggest causes of mortality including starvation and by-catch, although some incidents are likely to remain unreported (Ref 1-25). In addition, marine mammals foraging within the Humber Estuary region will routinely need to avoid collision with vessels and are, therefore, considered adapted to living in an environment with high levels of vessel activity. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Underwater noise effects on marine mammals | Marine piling | S1364: Grey seal *Halichoerus grypus* | Yes | Percussive (impact) and vibro marine piling will produce underwater noise above background conditions and at a level that may cause a risk of injury and behavioural changes to marine mammals if they are present in the vicinity of the Project. |
| | | | Capital dredge | S1364: Grey seal *Halichoerus grypus* | Yes | Elevated noise and vibration levels caused by the action of the dredger could potentially affect marine mammals by inducing adverse behavioural reactions. |
| | | | Dredge disposal | S1364: Grey seal *Halichoerus grypus* | Yes | Elevated noise and vibration levels caused by dredge disposal including the movement of the dredger to and from the |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | disposal site) could potentially affect marine mammals by inducing adverse behavioural reactions. |
| | | Visual disturbance of hauled out seals | Construction, dredging and dredge disposal | S1364: Grey seal *Halichoerus grypus* | No | The nearest established breeding colony for grey seals is located over 25km away at Donna Nook. Approximately ten to 15 grey seals were also observed hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary) during recent benthic surveys as detailed in Ref 1-26. This haul out site is located approximately 4km north east from the Project and around 3-4km from the dredge disposal sites (including transit routes). No seal haul out sites are known to occur nearer to the Project.<br><br>Seals which are hauled out on land, either resting or breeding, are considered particularly sensitive to visual disturbance (Ref 1-27).<br><br>The level of response of seals is dependent on a range of factors, such as the species at risk, age, weather conditions and the degree of habituation to the disturbance source. Hauled out seals have been recorded becoming alert to powered craft at distances of up to 800 m although seals generally only disperse into the water at distances <150-200 m (Ref 1-28; Ref 1- |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | 29; Ref 1-30; Ref 1-31). For example, in a study focusing on a colony of grey seals on the South Devon coast, vessels approaching at distances between 5m and 25m resulted in over 64% of seals entering the water, but at distances of between 50m and 100m only 1% entered the water (Ref 1-32). Recent disturbance research has also found no large-scale redistribution of seals after disturbance with most seals returning to the same haul out site within a tidal cycle (Ref 1-33).<br><br>Based on this evidence, seals hauled out on the intertidal habitats of Sunk Island (located on the opposite bank to the Project) are out of the zone of influence of any potential visual disturbance effects as a result of dredging, dredge disposal or construction activity. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Operation | Direct changes to qualifying habitats beneath marine infrastructure due to shading | Operation | H1140: Mudflats and sandflats not covered by seawater at low tide<br><br>H1130: Estuaries | Yes | Changes in sunlight levels as a result of shading due to marine infrastructure has the potential, albeit minimal, to cause changes to the benthic community occurring in an area. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | Changes to qualifying habitats as result of seabed removal during dredging | Maintenance dredging | H1140: Mudflats and sandflats not covered by seawater at low tide<br><br>H1130: Estuaries | Yes | Maintenance dredging causes the direct physical removal of marine sediments from the dredge footprint, resulting in the modification of existing marine habitats. The impacts to benthic fauna associated with the dredged material include changes to abundance and distribution through damage, mortality or relocation to a disposal site. Given that the dredge footprint has not previously been subject to any maintenance dredging, there is, therefore, considered to be a potential, albeit minimal, for LSE. |
| | | Changes to qualifying habitats as a result of sediment deposition | Maintenance dredging and disposal | H1130: Estuaries<br><br>H1140: Mudflats and sandflats not covered by seawater at low tide<br><br>H1110. Sandbanks which are slightly covered by sea water all the time | No | Maintenance dredge and dredge disposal will result in the deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats.<br><br>As a result of the expected limited maintenance dredging requirements, smaller changes in SSC and sedimentation (within the dredge plumes and at the disposal site) as compared to the capital dredge will occur. Deposition of sediment as a result of dredging will be highly localised and similar to background variability. The benthic species occurring within and near to the dredge area typically consist of burrowing infauna (such as |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | polychaetes and oligochaetes), which are considered tolerant to some sediment deposition. Based on evidence provided in relevant Marine Evidence based Sensitivity Assessment (MarESA) assessments, the characterising species recorded in the project-specific subtidal survey are considered tolerant to deposition of at least 50 mm with many species considered capable of burrowing through much greater levels of sediment deposition. The predicted millimetric changes in deposition are, therefore, considered unlikely to cause smothering effects. In addition, the species recorded in the benthic invertebrate surveys are fast growing and/or have rapid reproductive rates which allow populations to typically rapidly recolonise disturbed habitats, many within a few months following the disturbance events (Ref 1-34 Ref 1-35; Ref 1-36; Ref 1-37).<br><br>Clay Huts licensed disposal site (HU060) will be used for maintenance disposal (if required) as per the existing maintenance dredge licence.<br><br>The disposal site is located in the mid channel and is subject to regular natural physical disturbance (and associated scouring) as a result of very strong tidal flows. This disposal site is already used for |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | the disposal of maintenance dredge arisings (millions of wet tonnes of dredge sediment are disposed of at HU060 annually) which will also cause some disturbance due to sediment deposition. This is reflected in a generally impoverished assemblage at the disposal site.<br><br>The benthic species recorded include mobile infauna (such as errant polychaetes e.g., *Arenicola* spp. And amphipods) which are able to burrow through sediment. They are, therefore, considered tolerant to some sediment deposition. In addition, characterising species typically have opportunistic life history strategies, with short life histories (typically two years or less), rapid maturation and the production of large numbers of small propagules which makes them capable of rapid recoverability should mortality as a result of smothering occur (Ref 1-34; Ref 1-35; Ref 1-36; Ref 1-37; Ref 1-38). On this basis, any effects are considered to be temporary and short term. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | Indirect changes to qualifying habitats as a result of changes to hydrodynamic and sedimentary processes | Maintenance dredging and disposal | H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1110. Sandbanks which are slightly covered by sea water all the time | No | The predicted physical processes impacts from future maintenance dredging, if required, will be similar to that which already arises from the ongoing maintenance of the existing Immingham berths.<br>Maintenance dredging has the potential to result in changes to hydrodynamic and sedimentary processes (e.g., water levels, flow rates, changes to tidal prism, accretion and erosion patterns). However, as described in more detail in **Chapter 16: Physical Processes [APP-058]** only changes in hydrodynamic and sedimentary processes that are of a negligible magnitude are predicted. These changes will not be discernible against natural processes at nearby intertidal habitats. Furthermore, the predicted changes are not expected to modify existing subtidal habitat types found in the area. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | Changes in water and sediment quality on benthic habitats and species | Maintenance dredge and dredge disposal | H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1110. Sandbanks which are slightly covered by sea water all the time | No | The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Consequently, changes in water quality lower than for the capital dredge and at worst similar to the changes arising from existing maintenance dredging are expected.<br>Elevated SSCs due to maintenance dredging (if required) and dredge disposal are considered to be of a magnitude that can occur naturally or as a result of existing maintenance dredging/disposal. Sediment plumes resulting from dredging are also considered to dissipate rapidly and be immeasurable against background levels within a short duration of time.<br>Naturally very high SSCs typically occur year-round in the Humber Estuary, particularly during the winter months when storm events disturb the seabed and on spring tides. The estuarine benthic communities recorded in the region are considered tolerant to this highly turbid environment (Ref 1-35; Ref 1-36; Ref 1-37).<br>Magnitude of change in water quality is therefore assessed as negligible. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | The results of the sediment contamination sampling are summarised in the Water and Sediment Quality assessment (**Chapter 17: Marine Water and Sediment Quality [APP-059]**). In summary, low levels of contamination were found in the samples and there is no reason to believe the sediment will be unsuitable for disposal in the marine environment. During maintenance dredging and dredge disposal, sediment will be rapidly dispersed in the water column. Therefore, the already low levels of contaminants in the dredged sediments will be dispersed further. The probability of changes in water quality occurring at the disposal site is considered to be low and the overall exposure to change is considered to be negligible. The sensitivity of subtidal habitats and species to contaminants is assessed as low to moderate because, although contaminants can cause toxicity in subtidal communities, the concentrations of contaminants required to produce both lethal and sub-lethal effects are generally high (although responses vary considerably between species). This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Non-native species transfer during vessel operations | Vessel operations | H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1110. Sandbanks which are slightly covered by sea water all the time | Yes | Non-native species have the potential to be transported into the local area on the hulls of vessels during operation. Non-native invasive species also have the potential to be transported via vessel ballast water. Potential effects alone are considered in Section 4.12 although in-combination effects are assumed to be negligible and not of a magnitude to cause a LSE assuming that standard biosecurity measures are implemented for the Project development and also for other projects. |
| | | Physical change to habitats resulting from the deposition of airborne pollutants | Operational marine vessel emissions | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries<br>H1110. Sandbanks which are slightly covered by sea water all the time<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | Yes | Emissions from docked marine vessels and landside plant during operation have been modelled in **Chapter 6: Air Quality** of the ES **[APP-048]**. The potential for $NO_x$, $NH_3$, $SO_2$ and N deposition to affect designated habitats that are sensitive to these emission sources within the Humber Estuary EMS has been identified, as at some locations the 1% thresholds for the relevant Critical Levels/ Loads are exceeded. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | | |
| | | | Operational road vehicle emissions | H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1130: Estuaries<br>H1110. Sandbanks which are slightly covered by sea water all the time<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand<br>H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | No | There are no European sites within 200m of a road that will be used by project traffic (see **Chapter 6: Air Quality** of the ES **[APP-048]**). This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Changes to migratory fish habitat | Maintenance dredge and dredge disposal | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | No | The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Maintenance dredging and dredge disposal will result in the highly localised deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats. However, the maintenance dredge will not overlap with |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | the spawning grounds of lamprey which are further upstream in freshwater habitat. Both species are recorded in the estuary at other life stages with the growth phase of river lamprey primarily restricted to estuaries and both species also move through the estuary during spawning migrations. Therefore, given the high mobility of both river and sea lamprey (and also the parasitic fish prey of these species), lamprey will easily be able to avoid the zone of influence of the dredging and utilise other nearby areas with the footprint of dredging only represent a small proportion of the ranges of lamprey. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Changes in water and sediment quality on migratory fish | Maintenance dredge and dredge disposal | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | No | Changes in water quality are also expected to be lower than for the capital dredge and at worst similar to changes arising from existing maintenance dredging.<br>With specific respect to lamprey, these species are known to migrate through estuaries with high SSC (including the Humber Estuary). Elevated SSCs due to dredging are considered to be of a |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal.<br><br>Sediment plumes resulting from dredging and dredge disposal are also considered to dissipate rapidly and be immeasurable against background levels within a short duration of time. Therefore, lamprey would also be able to avoid any temporary sediment plumes. Based on these factors there is therefore considered limited potential for migrating fish to be adversely affected by the predicted changes in SSC.<br><br>With respect to sediment contamination, generally low levels of contamination were found in the sediment contamination samples as presented in the Water and Sediment Quality assessment in **Chapter 17: Marine Water and Sediment Quality [APP-059]**).<br><br>Based on this sampling data, the overall level of contamination in the proposed dredge area is considered to be low and the sediment plume would be expected to rapidly dissipate by the strong tidal currents in the area. Significant elevations in the concentrations of contaminants within the water column are not anticipated. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Underwater noise effects on migratory fish | Vessel operations including maintenance dredge and dredge disposal | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | No | During the operational phase there is the potential for noise disturbance to lamprey species as a result of vessel movements. The worst-case source level associated with vessels during operation is the same as for dredging activity. The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Only mild behavioural responses for lamprey species in relative proximity to operational vessels are anticipated with noise levels unlikely to be discernible above ambient levels in the wider Humber Estuary area given the high levels of existing background vessel noise in the area. Furthermore, the additional operational vessel movements resulting from the Project will only constitute a small increase in vessel traffic in the area (approximately a 3% increase alone and 6% with the IERRT project). This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | considered to be negligible and not of a magnitude to cause a LSE. |
| | | Lighting effects on migratory fish and seals | Vessel and berth operations | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis*<br>S1364: Grey seal *Halichoerus grypus* | No | With respect to potential lighting effects, the jetty will be lit for safety and operational purposes.<br>Beams of light from operational lighting will largely be restricted to the surface waters as light is unlikely to penetrate far into the water column given the high turbidity of the Humber Estuary. Furthermore, evidence suggest that lamprey are not considered to be particularly sensitive to lighting and will often be attracted to lighting rather than causing a barrier to movements (Ref 1-20 and Ref 1-21). Therefore, such localised changes would not cause disruption or blocking of migratory routes for these species. Seals are also known to forage in areas with artificial lighting (such as harbours, offshore wind farms and fish farms) with lighting not known to cause adverse effects in this species. Rather than disrupting any foraging movements, lighting might also have some minor and localised beneficial effects given that lighting has been shown to aggregate fish shoals and will also potentially improve foraging efficiency through enhancing vision of this predator near the surface. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Underwater noise effects on marine mammals | Maintenance dredge, dredge disposal and vessel operations | S1364: Grey seal *Halichoerus grypus* | No | During the operational phase there is the potential for noise disturbance to grey seal species as a result of vessel movements. The worst-case source level associated with vessels during operation is the same as for dredging activity. The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Only mild behavioural responses for seals in relative proximity to operational vessels are anticipated with noise levels unlikely to be discernible above ambient levels in the wider Humber Estuary area given the high levels of existing background vessel noise in the area. Furthermore, the additional operational vessel movements resulting from the Project will only constitute a small increase in vessel traffic in the area (approximately a 3% increase alone and 6% with the IERRT project). This impact pathway is therefore, not considered further in the Shadow HRA alone. In |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Visual disturbance of hauled out seals | Vessel operations, maintenance dredge and dredge disposal | S1364: Grey seal *Halichoerus grypus* | No | The nearest established breeding colony for grey seals is located over 25km away at Donna Nook. Approximately ten to 15 grey seals were also observed hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary) during recent benthic surveys as detailed in Ref 1-26. This haul out site is located approximately 4km north east from the Project. No seal haul out sites are known to occur nearer to the Project.<br><br>Seals which are hauled out on land, either resting or breeding, are considered particularly sensitive to visual disturbance (Ref 1-27).<br><br>The level of response of seals is dependent on a range of factors, such as the species at risk, age, weather conditions and the degree of habituation to the disturbance source. Hauled out seals have been recorded becoming alert to powered craft at distances of up to 800 m although seals generally only disperse into the water at distances <150-200 m (Ref 1-28; Ref 1-29; Ref 1-30; Ref 1-31). For example, in a study focusing on a colony of grey seals on |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | the South Devon coast, vessels approaching at distances between 5m and 25m resulted in over 64% of seals entering the water, but at distances of between 50m and 100m only 1% entered the water (Ref 1-32). Recent disturbance research has also found no large-scale redistribution of seals after disturbance with most seals returning to the same haul out site within a tidal cycle (Ref 1-33).<br><br>Based on this evidence, seals hauled out on the intertidal habitats of Sunk Island (located on the opposite bank to the Project) are out of the zone of influence of any potential visual disturbance effects as a result of maintenance dredging and vessel operations. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Collision risk to marine mammals | Vessel operations | S1364: Grey seal *Halichoerus grypus* | No | Vessels using the berths during operation will be typically approaching at slow speeds (2-4 knots) and maintenance dredging/dredge disposal will be mainly stationary or travelling at low speeds (2-6 knots), making the risk of collision very low. Although all types of vessels may collide |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | with marine mammals, vessels traveling at speeds over ten knots are considered to have a much higher probability of causing lethal injury (Ref 1-23). Furthermore, the region is already characterised by heavy shipping traffic. The additional operational vessel movements resulting from the Project will only constitute a small increase in vessel traffic in the area on a typical day. There will also be periodic maintenance dredger and barge movements.<br><br>In general, incidents of mortality or injury of marine mammals caused by vessels remain a relatively rare occurrence in UK waters (Ref 1-24; Ref 1-25). For example, out of 144 post mortem examinations carried out on cetaceans in 2018, only two (1.4%) were attributed to boat collision with the biggest causes of mortality including starvation and by-catch, although some incidents are likely to remain unreported (Ref 1-25). In addition, marine mammals frequently foraging within the region will routinely need to avoid collision with vessels and are, therefore, considered adapted to living in an environment with high levels of vessel activity. This impact pathway is, therefore, not considered further in the Shadow HRA. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| The Wash and North Norfolk Coast | Construction | Direct loss or changes in marine mammal foraging habitat | Construction (marine piling, capital dredge and dredge disposal) | S1365: Harbour seal *Phoca vitulina* | No | There is the potential for impacts to marine mammals as a result of changes to marine mammal foraging habitat and prey resources. However, the footprint of the Project only covers a highly localised area that constitutes a negligible fraction of the known ranges of local marine mammal populations. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Changes in water and sediment quality on marine mammals | Marine piling | | No | The negligible, highly localised and temporary changes in suspended sediment levels and related changes in sediment bound contaminants and dissolved oxygen associated with bed disturbance during marine piling will not result in significant effects in any marine mammal species. The potential for accidental spillages will also be negligible during construction through following established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | Capital dredge | S1365: Harbour seal *Phoca vitulina* | No | The plumes resulting from dredging are expected to have a minimal and local effect on SSC in the vicinity of the Project (as described in more detail in **Chapter 16: Physical Processes [APP-058]**). Marine mammals are well adapted to turbid conditions and, therefore, not sensitive to the scale of changes in SSC predicted during capital dredging (Ref 1-22). Given the limited extent of sediment dispersal significant elevations in water column contamination are unlikely. In addition, the temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub-lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Ref 1-22). Furthermore, potential for accidental spillages will also be negligible during all phases through the application of established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | negligible and not of a magnitude to cause a LSE. |
| | | | Dredge disposal | S1365: Harbour seal *Phoca vitulina* | No | The plumes resulting from dredge disposal are expected to have a minimal and local effect on SSC (as described in more detail in **Chapter 16: Physical Processes [APP-058]**). Marine mammals are well adapted to turbid conditions and, therefore, not sensitive to the scale of changes in SSC predicted during disposal (Ref 1-22). Given the limited extent of sediment dispersal significant elevations in water column contamination are unlikely. In addition, the temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub-lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Ref 1-22). Furthermore, potential for accidental spillages will also be negligible during construction through the application of established industry guidance and protocols. The potential for water quality impacts to marine mammal has therefore been scoped out of the assessment. This impact pathway is therefore, not |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Collision risk to marine mammals | Construction, dredging and dredge disposal | S1365: Harbour seal *Phoca vitulina* | No | Vessels involved in construction and dredging/dredge disposal will be mainly stationary or travelling at low speeds (2-6 knots), making the risk of collision very low. Although all types of vessels may collide with marine mammals, vessels traveling at speeds over ten knots are considered to have a much higher probability of causing lethal injury (Ref 1-23). Furthermore, the region is already characterised by heavy shipping traffic. The additional movements due to construction activity (including capital dredging) will only constitute a small increase in vessel traffic in the area which will also be temporary in nature.<br><br>In general, incidents of mortality or injury of marine mammals caused by vessels remain a relatively rare occurrence in UK waters (Ref 1-24; Ref 1-25). For example, out of 144 post mortem examinations carried out on cetaceans in 2018, only two (1.4%) were attributed to boat collision with the biggest causes of mortality including starvation and by-catch, although some incidents are likely to remain unreported |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | (Ref 1-25). In addition, marine mammals foraging within the Humber Estuary region will routinely need to avoid collision with vessels and are, therefore, considered adapted to living in an environment with high levels of vessel activity. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Lighting effects on marine mammals | Construction | S1365: Harbour seal *Phoca vitulina* | No | With respect to potential lighting effects during construction, equipment such as piling rigs, cranes etc. will be lit for safety reasons.<br><br>Beams of light from construction lighting will largely be restricted to the surface waters as light is unlikely to penetrate far into the water column given the high turbidity of the Humber Estuary. Seals are also known to forage in areas with artificial lighting (such as harbours, offshore wind farms and fish farms) with lighting not known to cause adverse effects in this species. Rather than disrupting any foraging movements, lighting might also have some minor and localised beneficial effects given that lighting has been shown to aggregate fish shoals and will also |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
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| | | | | | | potentially improve foraging efficiency through enhancing vision of this predator near the surface.<br>This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Underwater noise effects on marine mammals | Marine piling | S1365: Harbour seal *Phoca vitulina* | Yes | Percussive (impact) and vibro marine piling will produce underwater noise above background conditions and at a level that may cause a risk of injury and behavioural changes to marine mammals if they are present in the vicinity of the Project. |
| | | | Capital dredge | S1365: Harbour seal *Phoca vitulina* | Yes | Elevated noise and vibration levels caused by the action of the dredger could potentially affect marine mammals by inducing adverse behavioural reactions. |
| | | | Dredge disposal | S1365: Harbour seal *Phoca vitulina* | Yes | Elevated noise and vibration levels caused by the movement of the dredger to and from the disposal site could potentially affect marine mammals by inducing adverse behavioural reactions. |
| | | Visual disturbance of hauled out seals | Construction, dredging and dredge disposal | S1365: Harbour seal *Phoca vitulina* | No | The nearest known haul out site for common seals is located over 25km away at Donna Nook (which could potentially |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | have connectivity to the Wash and North Norfolk Coast SAC). Seals hauled out at Donna Nook are out of the zone of influence of any potential visual disturbance effects as a result of dredging, dredge disposal or construction activity. This impact pathway is, therefore, not considered further in the Shadow HRA. |
| | Operation | Underwater noise effects on marine mammals | Maintenance dredge, dredge disposal and vessel operations | S1365: Harbour seal *Phoca vitulina* | No | During the operational phase there is the potential for noise disturbance to common seal species as a result of vessel movements. The worst-case source level associated with vessels during operation is the same as for dredging activity. The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Only mild behavioural responses for seals in relative proximity to operational vessels are anticipated with noise levels unlikely to be discernible above ambient levels in the wider Humber Estuary area given the high levels of existing background vessel noise in the area. Furthermore, the additional operational vessel movements resulting from the Project will only constitute a small increase in vessel traffic in the area (approximately a 3% increase alone and 6% with the IERRT project). This impact pathway is therefore, not considered |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Visual disturbance of hauled out seals | Vessel operations, maintenance dredge and dredge disposal | S1365: Harbour seal *Phoca vitulina* | No | The nearest known haul out site for common seals is located over 25km away at Donna Nook (which could potentially have connectivity to the Wash and North Norfolk Coast SAC). Seals hauled out at Donna Nook are out of the zone of influence of any potential visual disturbance effects as a result of maintenance dredging and vessel operations. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Lighting effects on marine mammals | Operation | S1365: Harbour seal *Phoca vitulina* | No | With respect to potential lighting effects, the jetty will be lit for safety and operational purposes. Beams of light from operational lighting will largely be restricted to the surface waters as light is unlikely to penetrate far into the water column given the high turbidity of the Humber Estuary. Seals are also known to forage in areas with artificial lighting (such as harbours, offshore wind farms and fish farms) with |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
| --- | --- | --- | --- | --- | --- | --- |
| | | | | | | lighting not known to cause adverse effects in this species. Rather than disrupting any foraging movements, lighting might also have some minor and localised beneficial effects given that lighting has been shown to aggregate fish shoals and will also potentially improve foraging efficiency through enhancing vision of this predator near the surface.<br><br>This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Collision risk to marine mammals | Vessel operations | S1365: Harbour seal *Phoca vitulina* | No | Vessels using the berths during operation will be typically approaching at slow speeds (2-4 knots) and maintenance dredging/dredge disposal will be mainly stationary or travelling at low speeds (2-6 knots), making the risk of collision very low. Although all types of vessels may collide with marine mammals, vessels traveling at speeds over ten knots are considered to have a much higher probability of causing lethal injury (Ref 1-23). Furthermore, the region is already characterised by heavy shipping traffic. The additional operational vessel movements resulting from the Project will only constitute a small increase |

| Site | Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|---|
| | | | | | | in vessel traffic in the area on a typical day. There will also be periodic maintenance dredger and barge movements.<br>In general, incidents of mortality or injury of marine mammals caused by vessels remain a relatively rare occurrence in UK waters (Ref 1-24; Ref 1-25). For example, out of 144 post mortem examinations carried out on cetaceans in 2018, only two (1.4%) were attributed to boat collision with the biggest causes of mortality including starvation and by-catch, although some incidents are likely to remain unreported (Ref 1-25). In addition, marine mammals frequently foraging within the region will routinely need to avoid collision with vessels and are, therefore, considered adapted to living in an environment with high levels of vessel activity. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

**Table 4: Potential impacts that could result in LSE on features of the Humber Estuary SPA**

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| Construction | Direct loss of supporting intertidal habitat | Marine piling | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | Yes | Marine piling will cause a direct loss of a small area of intertidal habitat. This loss will be highly localised. However, given the protection afforded to the mudflat that is utilised by feeding waterbirds in this area, there is considered to be a potential for LSE on the waterbird features screened into the assessment (**Table 2**). |
| | Direct loss of terrestrial habitat outside the SPA boundary supporting feeding, roosting and loafing waterbirds ('functionally linked land'). | Construction of landside infrastructure | Waterbird assemblage | No | There is no functionally linked land within the Project boundary.<br>Surveys of the West Site in winter 2022 found the habitats to be unsuitable for feeding, roosting and foraging SPA waterbirds due to the presence of tall-swarded grassland and areas of scrub. No SPA waterbird species were |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | | | recorded during the surveys **(Section 1.4 of Appendix A)**.<br><br>The only SPA waterbird species recorded in the arable field within the temporary compound area in winter 2022/ 23 recorded was curlew; with only three records of single or low numbers (<5) birds **(Section 1.4 of Appendix A)** during the winter survey period. The five year mean peak count for this species within the Humber Estuary is 2,544, and therefore the 1% Humber Estuary threshold for this species that would indicate that an area of terrestrial habitat was important for the species within the estuary is 25 birds. The curlew counts within the temporary compound area are therefore significantly below this threshold, and therefore it is concluded that this is not functionally linked land to the SPA.<br><br>No other habitats within the terrestrial part of the Site boundary are suitable for |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
| --- | --- | --- | --- | --- | --- |
| | | | | | feeding, roosting and loafing waterbirds.<br><br>This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Capital dredge and dredge disposal | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br><br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br><br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br><br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br><br>Waterbird assemblage | No | The footprint of the capital dredge and dredge disposal sites do not overlap with the intertidal and would not cause any direct changes to intertidal feeding and roosting habitat used by qualifying SPA species screened into the assessment **(Table 2).**<br><br>This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
| --- | --- | --- | --- | --- | --- |
| | Indirect loss of supporting intertidal habitat as a result of changes to hydrodynamic and sedimentary processes | Marine works (jetty structure and capital dredging) | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | Yes | The jetty structure and capital dredge has the potential to result in changes to hydrodynamic and sedimentary processes (e.g. water levels, flow rates, changes to tidal prism, accretion and erosion patterns) which could cause erosion to intertidal mudflat used by feeding birds. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2)**. |
| | Changes in water or sediment quality | Capital dredging | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding) | No | All SPA features screened into the Shadow HRA **(Table 2**) are coastal waterbirds that feed on intertidal invertebrates by using the beak to capture prey on intertidal habitats (either when exposed to air or when covered in very shallow water). Therefore, they are not considered sensitive to the directs effects of elevated suspended sediment plumes (unlike diving birds which use pursuit or plunge diving to |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | Waterbird assemblage | | capture prey underwater). It is considered possible that SPA features could be sensitive to indirect effects resulting from changes to intertidal benthic habitats and species due to suspended sediment concentrations (i.e. changes to invertebrate prey resources on supporting mudflat). However, given estuarine benthic communities recorded on mudflats and the shallow mud in the region are considered tolerant to this highly turbid environment and the predicted SSCs are within the range that can frequently occur naturally and also as a result of ongoing dredge activity, potential effects of elevated SSC on prey resources are considered to be negligible **(Section 4.8)**. With respect to sediment contamination during construction, potential effects on intertidal benthic habitats and species are considered to be insignificant **(Section 4.9**). On this basis, potential effects on waterbirds as a result of |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | | | bioaccumulation through consuming prey (i.e. intertidal benthos) will be negligible. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Airborne noise and visual disturbance to coastal waterbirds within the SPA boundary. | Construction activity (including capital dredging) | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | Yes (marine construction activity)<br>No (landside piling) | During marine activity construction, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2)** both alone and in-combination with other plans and projects.<br>There is the potential for landside piling to cause potential noise disturbance to coastal waterbirds on the adjacent foreshore. However, terrestrial noise modelling has predicted that the nearest landside piling to the foreshore |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | | | (within Work Area No. 5. associated with piling of the foundations of the ammonia storage tanks) is predicted to cause noise levels <55 dB $L_{Aeq,1hr}$ and <65 dB $L_{Amax}$ on the foreshore. This is lower than the 70 dB criteria applied in the assessment and also in the range of background noise in the local Port of Immingham area. The terrestrial piling is also more than 300 m from the foreshore (which is greater than the 200 m disturbance buffer applied in the assessment). On this basis, SPA waterbird features on the foreshore are predicted to be out of the zone of potential disturbance effects arising from terrestrial piling noise during construction. On this basis, terrestrial noise due to landside piling is not considered to result in an LSE. |
| | Airborne noise and visual disturbance to coastal waterbirds | Construction | A048; Common Shelduck (Non-breeding) *Tadorna tadorna* | No | There is no functionally linked land within or adjacent to the Project boundary. This impact |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | using functionally linked land outside the SPA boundary. | | A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | | pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Lighting effects on coastal waterbirds during construction | Construction | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | Yes | With respect to potential lighting effects, construction equipment such as marine piling rigs, cranes, etc., will be lit for safety reasons. Artificial lighting can improve foraging conditions at night for waterbirds but has also been shown to potentially cause behavioural responses linked to increased perceived predation risk. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment (**Table 2**). Potential effects alone are considered in **Section 4.13** although in-combination effects are assumed to be negligible and not of a |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | | | magnitude to cause a LSE given the already high levels of existing lighting (in these industrial areas). |
| Operation | Potential mortality or injury to coastal waterbirds as a result of flare stacks | Flare stack operation | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br><br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br><br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br><br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br><br>Waterbird assemblage | No | Flare stacks have the potential to cause incidental mortality to birds during nocturnal periods with the flame emitted during a flaring event known to attract birds in some situations. Most incidents reported have been as a result of birds using the structures as a nocturnal roosting perch and/or birds attracted to the illumination of the flare during migratory movements.<br><br>It should be noted that evidence suggests that effects on birds have been recorded as a result of flare stacks associated with offshore oil and gas platforms or refineries (Ref 1-41). These structures have very large open flames that are active as part of normal operations. In contrast, |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | | | the flare stacks proposed as part of the Project will be much smaller in comparison, with the flame largely enclosed as a result of shrouding. Furthermore, they are only required to be used during start up, shut down and emergency use (typically less than 5 % of the time annually).<br><br>In addition, no supporting terrestrial habitat for SPA species occurs within the Project boundary. Furthermore, the SPA waterbird species screened in **(Table 2)** are not known to use stacks or other similar structures in industrial areas of the Humber Estuary for roosting. In addition, the locations where the flare stacks will be installed (in the East Site-Ammonia Storage, East Site-Hydrogen Production Facility and West Site) are not in a known flight path route |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | | | between the foreshore and nearby functionally linked land areas with flight path survey data suggesting only very limited flights occur (during winter, migratory passage and summer months) (Ref 1-42). Flare stacks are also a feature of the industrial landscape in the local area with local populations of SPA birds considered accustomed to these features with no evidence to suggest that local populations have been affected by flare stacks from nearby refineries.<br><br>Based on all these considerations, the risk of flare stacks causing injury or morality is considered to be negligible and will not result in a LSE to any waterbird features alone or in-combination. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | Changes to coastal waterbird foraging and roosting habitat as a result of marine infrastructure | Berth operations | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | Yes | Marine infrastructure associated with the Project (raised jetty structure etc.) could potentially cause direct damage or reduced functionality to waterbird feeding and roosting habitat. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2).** |
| | Airborne noise and visual disturbance to coastal waterbirds within the SPA boundary | Berth operations | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | Yes | During operation, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds within the SPA boundary. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2)**. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | Lighting effects on coastal waterbirds during operation | Berth operations | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | No | Waders and other waterbirds feeding on intertidal mudflats are known to feed nocturnally. Evidence suggests that artificial illumination can improve foraging (through increasing prey intake rate) and can, therefore, lighting can have a positive effect on the nocturnal foraging of waterbirds (Ref 1-39). Artificial lighting has also been found in some situations to increase potential perceived predation risk in waders which can cause increased behavioural responses in areas with higher intensity illumination (Ref 1-40).<br><br>Further analysis suggests that operational lighting effects on the foreshore and Humber Estuary will be highly localised to the immediate vicinity of the jetty with light spill falling to 2 |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | | | | lux[3] within 7.5 m of the jetty and reaching levels consistent with current background illumination within 15 –20 m of the jetty.<br><br>On this basis, potential operational lighting effects are considered to be highly localised and of negligible magnitude not considered to result in a LSE to any waterbird features alone or in-combination. |
| Decommissioning | Airborne noise and visual disturbance to coastal waterbirds within the Ramsar boundary | Landside decommissioning of the removal of pipe racks within Work Area 2 (the jetty access road) and plant and equipment on the approach jetty topside associated with hydrogen | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br><br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br><br>A149: Dunlin *Calidris alpina alpina* (Non-breeding) | Yes | During decommissioning, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2)**. |

[3] For context, moonlight on a full moon can be up to 1-2 lux with direct sunlight over 100,000 lux (https://www.seratechnologies.com/what-is-lux-and-what-level-should-it-be).

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone and In-combination | Justification |
|---|---|---|---|---|---|
| | | production (within Work Area 1). | A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | | |

**Table 5: Potential impacts that could result in LSE on features of the Humber Estuary Ramsar**

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| Construction | Direct loss of qualifying intertidal habitat | Marine piling | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes | Marine piling will result in the small loss of intertidal. |
| | Direct loss of qualifying subtidal habitat | Marine piling | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud | Yes | Marine piling will also result in a loss, albeit minimal, of subtidal. This impact pathway has, therefore, been scoped into the assessment. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |
| | Direct changes to qualifying intertidal as result of seabed removal during dredging | Capital dredge | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes | Capital dredging causes the direct physical removal of marine sediments from the dredge footprint, resulting in the modification of existing marine habitats. The impacts to benthic fauna associated with the dredged material include changes to abundance and distribution through damage, mortality or relocation to a disposal site. |
| | Direct changes to qualifying habitats as a result of sediment deposition | Marine piling | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine | No | Marine piling has the potential to result in the localised resuspension of sediment as a result of seabed disturbance. Sediment that settles out of suspension back onto the seabed as result of marine piling is expected to be negligible and benthic habitats and species are not expected to be sensitive to this level of change. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |
| | | Capital dredge | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes | Capital dredging has the potential to result in localised physical disturbance and smothering of seabed habitats and species (where the sediment settles out of suspension back onto the seabed). |
| | | Dredge disposal | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid | Yes | Dredge disposal will result in the deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |
| | Indirect loss or change to qualifying habitats and species as a result of changes to hydrodynamic and sedimentary processes | Marine works (jetty structure and capital dredging) | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes | The jetty structure and capital dredge have the potential to result in changes to hydrodynamic and sedimentary processes (e.g., flow rates, accretion and erosion patterns). Marine invertebrates inhabiting sand and mud habitat show different tolerance ranges to physiological stresses caused by tidal exposure and tidal elevation and, therefore, hydrodynamic and bathymetric changes caused by the dredging could affect the quality of marine habitats and change the distribution of marine species. |
| | | Dredge disposal | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: | Yes | The disposal of dredged material at the marine disposal site has the potential to result in changes to hydrodynamic and sedimentary processes (e.g., water levels, flow rates, changes to tidal prism, accretion and erosion patterns). Marine invertebrates inhabiting sand and mud habitat show different tolerance ranges to physiological stresses caused by tidal exposure and tidal elevation and, therefore, hydrodynamic and bathymetric changes |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | caused by the disposal could affect the quality of marine habitats and change the distribution of marine species. |
| | Changes in water and sediment quality on benthic habitats and species | Marine piling | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | No | The negligible, highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) associated with bed disturbance during marine piling is considered unlikely to produce adverse effects in any species. The potential for accidental spillages will also be negligible during construction through following established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Capital dredge | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following | Yes | Changes in water quality during capital dredging could impact benthic habitats and species through an increase in SSC and the release of toxic contaminants bound in sediments |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |
| | | Dredge disposal | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes | Changes in water quality could occur during dredged material disposal through the deposition of material causing elevated SSC and contaminant levels. This could potentially impact on benthic habitats and species. |
| | | Surface water drainage | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary | No | Standard measures to control surface water run-off during construction are embedded within the Project design to ensure legislative compliance, and therefore it is very unlikely that contaminated run-off would enter the Humber Estuary. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | The potential introduction and spread of non-native species | Construction, dredging and dredge disposal | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes | Non-native species have the potential to be transported into the local area as a result of construction, dredging and dredge disposal activity. Potential effects alone are considered in Section 4.12 although in-combination effects are assumed to be negligible and not of a magnitude to cause a LSE assuming that standard biosecurity measures are implemented for the Project and also for other projects. |
| | Physical change to habitats resulting from the deposition of airborne pollutants | Construction | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example | No | The assessment has considered a scenario of peak construction vessel operation (see **Chapter 6: Air Quality** of the ES **[APP-048]**). Given the limited number of construction vessel emissions sources, the frequency of operation and distance between source and sensitive receptors (over 3km away from |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | the nearest saltmarsh habitat), it is considered highly unlikely that this source could contribute to a significant effect on local air quality. Transport emissions have a much smaller dispersal distance than energy from waste facilities and other significant emitters for which a 10km zone of influence would be more appropriate. While the zone of influence for ship exhaust stacks will be greater than that for vehicle exhausts (where the zone of influence is 200m) this has been allowed for in the precautionary use of a 3km zone of influence.<br><br>That this is a precautionary distance is indicated by guidance from Defra on the zone of influence of vessel emissions in their Local Air Quality Management Technical Guidance[4]. That guidance requires local authorities to consider emissions from vessels for the purpose of Local Air Quality Management only where there is relevant exposure within either 250m or 1km of the berths and main areas of manoeuvring, subject to the number of "large ship movements". The construction vessels to be utilised for the construction of the IGET project do not fall under the definition provided in the LAQM TG(22) guidance for large ships. Smaller construction vessels with less weight will not require the same energy demand as large ships and will therefore have lower emissions. |

4 UK Regions (exc. London) Technical Guidance | LAQM (defra.gov.uk)

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | | | The designated habitats closest to the construction site are intertidal habitats and are therefore not sensitive to changes in air quality due to dust smothering or marine vessel/ road vehicle emissions during construction. Although there are areas of designated habitat within the Humber Estuary Ramsar that are nearer to the source of vessel emissions, these are intertidal mudflats and subtidal estuarine habitats that do not support any rooted plants that could be sensitive to vessel emissions.<br><br>All available critical loads (and levels) are based on research into impacts on 'rooted macrophytes' (i.e. conventional plants) or (for ammonia) lichens & bryophytes. In other words, they have all been based on impacts on plant communities which obtain their nutrients either through their roots or directly from atmosphere. Unvegetated intertidal mudflat has no such vegetation communities and therefore it would be completely inappropriate to use the available critical loads.<br><br>While intertidal mudflats supporting pioneer saltmarsh vegetation can be sensitive to nutrients in some circumstances, where they cause excessive macroalgal (seaweed) growth, the APIS notes that even for saltmarsh *'Overall N deposition [from atmosphere] is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs'*. It is also considered that the Humber Estuary is likely to be at relatively low risk of smothering from macroalgae, given the role of high |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | | | sediment load in limiting sunlight penetration and strong wave action in breaking up macroalgae mats. There are no European sites within 200m of a road that will be used by project traffic (see **Chapter 6: Air Quality** of the ES **[APP-048]**). There are therefore no roads that exceed the National Highways DMRB screening criteria on the Strategic Road Network (see **Chapter 6: Air Quality** of the ES **[APP-048]**). There is therefore no potential for construction road vehicle emissions to give rise to LSEs on designated habitats. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Direct loss or changes to migratory fish habitat | Marine piling | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path: The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal | No | There is the potential for impacts to fish as a result of habitat loss due to installation of piles and the footprint of the Project. However, the direct footprint of the marine piling only covers a highly localised area with the mobile nature of lamprey allowing them to utilise nearby areas. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | waters and their spawning areas. | | |
| | | Capital dredge | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | No | Backhoe dredging can directly remove fish and fish eggs in the bucket. In addition, capital dredging has the potential to result in seabed disturbance and smothering of seabed habitats and species. However, the capital dredge will not overlap with the spawning grounds of lamprey which are further upstream in freshwater habitat. Both species are recorded in the estuary at other life stages with the growth phase of river lamprey primarily restricted to estuaries and both species also move through the estuary during spawning migrations. Given the very small dredge footprint in the context of the entire Humber Estuary (and small amount of material that needs to be dredged), the probability that lamprey species will be removed into the bucket during backhoe dredging while passing through the estuary on migration is considered to be low. In addition, given the high mobility of both river and sea lamprey (and also the parasitic fish prey of these species), lamprey will easily be able to avoid the zone of influence of the dredging and utilise other nearby areas with the footprint of dredging only represent a small proportion of the ranges of lamprey. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | Dredge disposal | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | No | Disposal at the marine disposal site will result in the deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats. However, the capital dredge will not overlap with the spawning grounds of lamprey which are further upstream in freshwater habitat. Both species are recorded in the estuary at other life stages with the growth phase of river lamprey primarily restricted to estuaries and both species also move through the estuary during spawning migrations. Therefore, given the high mobility of both river and sea lamprey (and also the parasitic fish prey of these species), lamprey will easily be able to avoid the zone of influence of the dredging and utilise other nearby areas with the footprint of dredging only represent a small proportion of the ranges of lamprey. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Changes in water and sediment quality on migratory fish species | Marine piling | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra* | No | The expected highly localised and temporary changes in suspended sediment levels and related changes in sediment bound contaminants and dissolved oxygen associated with bed disturbance during marine piling are considered highly unlikely to produce adverse effects in any fish species. The potential for accidental spillages will also be negligible during construction through following established industry guidance and protocols. This impact pathway is therefore, not considered further |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | *fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Capital dredge | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | Yes | Changes in water quality during capital dredging could impact migratory fish species through an increase in SSC and the release of toxic contaminants bound in sediments. |
| | | Dredge disposal | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both | Yes | Changes in water quality could occur during dredged material disposal through the deposition of material causing elevated SSC and contaminant levels. This could potentially impact on migratory fish species. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | river lamprey Lampetra fluviatilis and sea lamprey Petromyzon marinus between coastal waters and their spawning areas. | | |
| | Underwater noise effects on migratory fish species | Marine piling | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | Yes | During marine piling, there is the potential for noise disturbance to fish. Percussive (impact) and vibro marine piling will produce underwater noise above background conditions and at a level that may cause a risk of injury and behavioural changes to fish in the vicinity of the Project. |
| | | Capital dredge | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important | Yes | Elevated underwater noise and vibration levels caused by the action of the dredger could potentially affect migratory fish. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | |
| | | Dredge disposal | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | Yes | Underwater noise and vibration levels caused by the movement of the dredger to and from the disposal site could potentially affect migratory fish. |
| | Lighting effects on migratory fish and seals | Construction | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path: | No | With respect to potential lighting effects during construction, equipment such as marine piling rigs, cranes etc. will be lit for safety reasons.<br>Beams of light from construction lighting will largely be restricted to the surface waters as light is unlikely to penetrate far into the water column given the high turbidity of the Humber Estuary. Furthermore, |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas.<br>Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | | evidence suggest that lamprey are not considered to be particularly sensitive to lighting and will often be attracted to lighting rather than causing a barrier to movements (Ref 1-20 and Ref 1-21). Therefore, such localised changes would not cause disruption or blocking of migratory routes for these species. Seals are also known to forage in areas with artificial lighting (such as harbours, offshore wind farms and fish farms) with lighting not known to cause adverse effects in this species. Rather than disrupting any foraging movements, lighting might also have some minor and localised beneficial effects given that lighting has been shown to aggregate fish shoals and will also potentially improve foraging efficiency through enhancing vision of this predator near the surface. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Direct loss or changes in marine mammal foraging habitat | Construction (marine piling, capital dredge and dredge disposal) | Criterion 3 – supports populations of plants and/or animal species of international importance: | No | There is the potential for impacts to marine mammals as a result of changes to marine mammal foraging habitat and prey resources. However, the footprint of the Project only covers a highly localised area that constitutes a negligible fraction of the |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | | known ranges of local marine mammal populations. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Changes in water and sediment quality on marine mammals | Marine piling | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | No | The negligible, highly localised and temporary changes in suspended sediment levels and related changes in sediment bound contaminants and dissolved oxygen associated with bed disturbance during marine piling, is considered highly unlikely to produce adverse effects in any marine mammal species. The potential for accidental spillages will also be negligible during construction through following established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Capital dredge | Criterion 3 – supports populations of plants and/or animal species of international importance: | No | The plumes resulting from dredging are expected to have a minimal and local effect on SSC in the vicinity of the Project (as described in more detail in **Chapter 16: Physical Processes [APP-058]**). Marine mammals are well adapted to turbid |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | | conditions and, therefore, not sensitive to the scale of changes in SSC predicted during capital dredging (Ref 1-22). Given the limited extent of sediment dispersal significant elevations in water column contamination are unlikely. In addition, the temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub-lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Ref 1-22). Furthermore, potential for accidental spillages will also be negligible during all phases through the application of established industry guidance and protocols. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | | Dredge disposal | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and | No | The plumes resulting from dredge disposal are expected to have a minimal and local effect on SSC (as described in more detail in **Chapter 16: Physical Processes [APP-058]**). Marine mammals are well adapted to turbid conditions and, therefore, not sensitive to the scale of changes in SSC predicted during disposal (Ref 1-22). Given the limited extent of sediment dispersal significant elevations in water column contamination are unlikely. In addition, the temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal and sub- |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | the furthest south regular breeding site on the east coast. | | lethal effects in these highly mobile species (the concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated) (Ref 1-22). Furthermore, potential for accidental spillages will also be negligible during construction through the application of established industry guidance and protocols. The potential for water quality impacts to marine mammal has therefore been scoped out of the assessment. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Collision risk to marine mammals | Construction, dredging and dredge disposal | Criterion 3 – supports populations of plants and/or animal species of international importance:<br><br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | No | Vessels involved in construction and dredging/dredge disposal will be mainly stationary or travelling at low speeds (2-6 knots), making the risk of collision very low. Although all types of vessels may collide with marine mammals, vessels traveling at speeds over ten knots are considered to have a much higher probability of causing lethal injury (Ref 1-23). Furthermore, the region is already characterised by heavy shipping traffic. The additional movements due to construction activity (including capital dredging) will only constitute a small increase in vessel traffic in the area which will also be temporary in nature.<br><br>In general, incidents of mortality or injury of marine mammals caused by vessels remain a relatively rare occurrence in UK waters (Ref 1-24; Ref 1-25). For |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | | | example, out of 144 post mortem examinations carried out on cetaceans in 2018, only two (1.4%) were attributed to boat collision with the biggest causes of mortality including starvation and by-catch, although some incidents are likely to remain unreported (Ref 1-25). In addition, marine mammals foraging within the Humber Estuary region will routinely need to avoid collision with vessels and are, therefore, considered adapted to living in an environment with high levels of vessel activity. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Underwater noise effects on marine mammals | Marine piling | Criterion 3 – supports populations of plants and/or animal species of international importance:<br><br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | Yes | Percussive (impact) and vibro marine piling will produce underwater noise above background conditions and at a level that may cause a risk of injury and behavioural changes to marine mammals in the vicinity of the proposed development. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | Capital dredge | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | Yes | Elevated noise and vibration levels caused by the action of the dredger could potentially affect marine mammals by inducing adverse behavioural reactions. |
| | | Dredge disposal | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals Halichoerus grypus at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | Yes | Elevated noise and vibration levels caused by the movement of the dredger to and from the disposal site could potentially affect marine mammals by inducing adverse behavioural reactions. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | Visual disturbance of hauled out seals | Construction, dredging and dredge disposal | Criterion 3 – supports populations of plants and/or animal species of international importance:<br><br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | No | The nearest established breeding colony for grey seals is located over 25km away at Donna Nook. Approximately ten to 15 grey seals were also observed hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary) during recent benthic surveys as detailed in Ref 1-26. This haul out site is located approximately 4km north east from the Project and around 3-4km from the dredge disposal sites (including transit routes). No seal haul out sites are known to occur nearer to the Project.<br><br>Seals which are hauled out on land, either resting or breeding, are considered particularly sensitive to visual disturbance (Ref 1-27).<br><br>The level of response of seals is dependent on a range of factors, such as the species at risk, age, weather conditions and the degree of habituation to the disturbance source. Hauled out seals have been recorded becoming alert to powered craft at distances of up to 800 m although seals generally only disperse into the water at distances <150-200m (Ref 1-28; Ref 1-29; Ref 1-30; Ref 1-31). For example, in a study focusing on a colony of grey seals on the South Devon coast, vessels approaching at distances between 5m and 25m resulted in over 64% of seals entering the water, but at distances of between 50m and 100m only 1% entered the water (Ref 1-32). Recent disturbance research has also found no large-scale redistribution of seals after disturbance with most seals returning |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | | | to the same haul out site within a tidal cycle (Ref 1-33).<br>Based on this evidence, seals hauled out on the intertidal habitats of Sunk Island (located on the opposite bank to the Project) are out of the zone of influence of any potential visual disturbance effects as a result of dredging, dredge disposal or construction activity. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Direct loss of supporting intertidal habitat | Marine piling | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage) | Yes | Marine piling will cause a direct loss of intertidal habitat. This loss will be highly localised. However, given the protection afforded to the mudflat that is utilised by feeding waterbirds in this area, there is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2).** |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |
| | | Capital dredge | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | No | The footprint of the capital dredge and dredge disposal sites do not overlap with the intertidal and would not cause any direct changes to intertidal feeding and roosting habitat used by qualifying Ramsar species screened into the assessment **(Table 2).** This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | Direct loss of terrestrial habitat outside the Ramsar boundary supporting feeding, roosting and loafing waterbirds ('functionally linked land'). | Construction of landside infrastructure | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | No | There is no functionally linked land within or adjacent to the Site Boundary. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | Indirect loss of supporting intertidal habitat as a result of changes to hydrodynamic and sedimentary processes | Marine works (jetty structure and capital dredging) | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | Yes | The jetty structure and capital dredge has the potential to result in changes to hydrodynamic and sedimentary processes (e.g. water levels, flow rates, changes to tidal prism, accretion and erosion patterns) which could cause erosion to intertidal mudflat used by feeding birds. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2).** |
| | Changes in water or sediment quality | Capital dredging | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five | No | All Ramsar features screened into the Shadow HRA are coastal waterbirds that feed on intertidal invertebrates by using the beak to capture prey on intertidal habitats (either when exposed to air or when covered in very shallow water). Therefore, they are not considered sensitive to the directs effects of elevated suspended sediment plumes |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering | | (unlike diving birds which use pursuit or plunge diving to capture prey underwater). It is considered possible that Ramsar features could be sensitive to indirect effects resulting from changes to intertidal benthic habitats and species due to suspended sediment concentrations (i.e. changes to invertebrate prey resources on supporting mudflat). However, given estuarine benthic communities recorded on mudflats and the shallow mud in the region are considered tolerant to this highly turbid environment and the predicted SSCs are within the range that can frequently occur naturally and also as a result of ongoing dredge activity, potential effects of elevated SSC on prey resources are considered to be negligible **(Section 4.8)**. With respect to sediment contamination during construction, potential effects on intertidal benthic habitats and species are considered to be insignificant **(Section 4.9).** On this basis, potential effects on waterbirds as a result of bioaccumulation through consuming prey (i.e. intertidal benthos) will be negligible.<br>This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Airborne noise and visual disturbance to coastal waterbirds within | Construction activity (including capital dredging) | Criterion 5 – Bird Assemblages of International Importance: | Yes (marine construction activity) | During marine construction, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds. There is, therefore, considered to |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | the Ramsar boundary. | | Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | No (landside piling) | be a potential for LSE on the waterbird features screened into the assessment **(Table 2)**.<br><br>There is the potential for landside piling to cause potential noise disturbance to coastal waterbirds on the adjacent foreshore. However, terrestrial noise modelling has predicted that the nearest landside piling to the foreshore (within Work Area No. 5. associated with piling of the foundations of the ammonia storage tanks) is predicted to cause noise levels <55 dB $L_{Aeq,1hr}$ and <65 dB $L_{Amax}$ on the foreshore. This is lower than the 70 dB criteria applied in the assessment and also in the range of background noise in the local Port of Immingham area. The terrestrial piling is also more than 300 m from the foreshore (which is greater than the 200 m disturbance buffer applied in the assessment). On this basis, SPA waterbird features on the foreshore are predicted to be out of the zone of potential disturbance effects arising from terrestrial piling noise during construction. On this basis, terrestrial noise due to landside piling is not considered to result in an LSE. |
| | Airborne noise and visual disturbance to coastal waterbirds using functionally linked | Construction | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five | No | There is no functionally linked land within or adjacent to the Site Boundary.<br>This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in- |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | land outside the Ramsar boundary. | | year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br><br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Lighting effects on coastal waterbirds during construction | Construction | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed | Yes | With respect to potential lighting effects, construction equipment such as marine piling rigs, cranes, etc., will be lit for safety reasons. Artificial lighting can improve foraging conditions at night for waterbirds but has also been shown to potentially cause behavioural responses linked to increased perceived predation risk. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment (**Table 2**). Potential effects alone are considered in **Section 4.13** although in-combination effects are assumed to be negligible and not of a magnitude to cause a LSE given the already high levels of existing lighting (in these industrial areas). |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |
| Operation | Direct changes to qualifying habitat beneath marine infrastructure due to shading | Operation | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes | Changes in sunlight levels as a result of shading due to marine infrastructure has the potential to cause changes to the benthic community occurring in an area. |
| | Changes to qualifying habitat | Maintenance dredging | Criterion 1 – natural wetland habitats that are | Yes | Maintenance dredging causes the direct physical removal of marine sediments from the dredge |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | as result of seabed removal during dredging | | of international importance: The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | footprint, resulting in the modification of existing marine habitats. The impacts to benthic fauna associated with the dredged material include changes to abundance and distribution through damage, mortality or relocation to a disposal site. Given that the dredge footprint has not previously been subject to any maintenance dredging, there is, therefore, considered to be a potential for LSE on this feature. |
| | Changes to qualifying habitat as a result of sediment deposition | Maintenance dredging and disposal | Criterion 1 – natural wetland habitats that are of international importance: The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | No | Maintenance dredge and dredge disposal will result in the deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats. As a result of the expected limited maintenance dredging requirements, smaller changes in SSC and sedimentation (within the dredge plumes and at the disposal site) as compared to the capital dredge will occur. Deposition of sediment as a result of dredging will be highly localised and similar to background variability. The benthic species occurring within and near to the dredge area typically consist of burrowing infauna (such as polychaetes and oligochaetes), which are considered tolerant to some sediment deposition. The predicted millimetric changes in deposition are, therefore, considered unlikely to cause smothering effects. In addition, the |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | | | species recorded in the benthic invertebrate surveys are fast growing and/or have rapid reproductive rates which allow populations to typically rapidly recolonise disturbed habitats, many within a few months following the disturbance events (Ref 1-34; Ref 1-35; Ref 1-36; Ref 1-37).<br><br>Clay Huts licensed disposal site (HU060) will be used for maintenance disposal (if required) as per the existing maintenance dredge licence.<br><br>The disposal site is located in the mid channel and are subject to regular natural physical disturbance (and associated scouring) as a result of very strong tidal flows. This disposal site is already used for the disposal of maintenance dredge arisings (millions of wet tonnes of dredge sediment are disposed of at HU060 annually) which will also cause some disturbance due to sediment deposition. This is reflected in a generally impoverished assemblage at the disposal site.<br><br>The benthic species recorded include mobile infauna (such as errant polychaetes e.g., *Arenicola* spp. and amphipods) which are able to burrow through sediment. They are, therefore, considered tolerant to some sediment deposition. In addition, characterising species typically have opportunistic life history strategies, with short life histories (typically two years or less), rapid maturation and the production of large numbers of small propagules which makes them capable of rapid recoverability should mortality as a result of smothering occur (Ref |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
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| | | | | | 1-34; Ref 1-35; Ref 1-43; Ref 1-37; Ref 1-38). On this basis, any effects are considered to be temporary and short term. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Indirect changes to qualifying habitats as a result of changes to hydrodynamic and sedimentary processes | Maintenance dredging and disposal | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | No | The predicted physical processes impacts from future maintenance dredging will be similar to those which already arise from the ongoing maintenance of the existing Immingham berths.<br>Maintenance dredging has the potential to result in changes to hydrodynamic and sedimentary processes (e.g. water levels, flow rates, changes to tidal prism, accretion and erosion patterns). However, changes in hydrodynamic and sedimentary processes that are of a negligible magnitude are expected as a result of the expected limited maintenance dredging requirements. Such changes are unlikely to be discernible against natural processes at nearby intertidal habitats. Furthermore, such changes are not expected to modify existing subtidal habitat types found in the area. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE.. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | Changes in water and sediment quality on benthic habitats and species | Maintenance dredge and dredge disposal | Criterion 1 – natural wetland habitats that are of international importance:<br><br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | No | The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Consequently, changes in water quality lower than for the capital dredge and at worst similar to changes arising from existing maintenance dredging is expected.<br><br>Elevated SSCs due to maintenance dredging and dredge disposal are anticipated to be of a magnitude that can occur naturally or as a result of existing maintenance dredging/disposal and sediment plumes resulting from dredging would also be expected to dissipate rapidly and be immeasurable against background levels within a short duration of time.<br><br>Naturally very high SSCs typically occur year-round in the Humber Estuary, particularly during the winter months when storm events disturb the seabed and on spring tides. The estuarine benthic communities recorded in the region are considered tolerant to this highly turbid environment (Ref 1-35; Ref 1-36; Ref 1-37).<br><br>Magnitude of change is therefore assessed as negligible.<br><br>The results of the sediment contamination sampling are summarised above and the Water and Sediment Quality assessment (**Chapter 17: Marine Water and Sediment Quality [APP-059]**). In summary, low levels of contamination were found in the samples and there is no reason to believe the |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | | | sediment will be unsuitable for disposal in the marine environment. During maintenance dredging and dredge disposal, sediment will be rapidly dispersed in the water column. Therefore, the already low levels of contaminants in the dredged sediments will be dispersed further. The probability of changes in water quality occurring at the disposal site is considered to be low and the overall exposure to change is considered to be negligible. The sensitivity of subtidal habitats and species to contaminants is assessed as low to moderate because, although contaminants can cause toxicity in subtidal communities, the concentrations of contaminants required to produce both lethal and sub-lethal effects are generally high (although responses vary considerably between species). This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Non-native species transfer during vessel operations | Vessel operations | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid | Yes | Non-native species have the potential to be transported into the local area on the hulls of vessels during operation. Non-native invasive species also have the potential to be transported via vessel ballast water. Potential effects alone are considered in Section 4.12 although in-combination effects are assumed to be negligible and not of a magnitude to cause a LSE assuming that standard biosecurity measures are implemented for the Project and also for other projects. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |
| | Physical change to habitats resulting from the deposition of airborne pollutants. | Operational marine vessel emissions | Criterion 1 – natural wetland habitats that are of international importance:<br><br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Yes (NOx and N deposition) | Emissions from docked marine vessels and landside plant during operation have been modelled in **Chapter 6: Air Quality** of the ES **[APP-048]**. The potential for $NO_x$, $NH_3$, $SO_2$ and N deposition to affect designated habitats that are sensitive to these emission sources within the Humber Estuary EMS has been identified, as at some locations the 1% thresholds for the relevant Critical Levels/ Loads are exceeded.<br><br>The predicted $NH_3$ concentrations are below 1% of the Critical Level threshold at all receptors both alone and in-combination. |
| | | Operational road vehicle emissions | Criterion 1 – natural wetland habitats that are of international importance:<br><br>The site is a representative example of a near-natural estuary with the following component habitats: | No | There are no European sites within 200m of a road that will be used by project traffic (see **Chapter 6: Air Quality** of the ES **[APP-048]**). Likely Significant Effects are therefore screened out of this pathway. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |
| | Changes to migratory fish habitat | Maintenance dredge and dredge disposal | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br><br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | No | The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Maintenance dredging and dredge disposal will result in the highly localised deposition of sediments which has the potential to cause physical disturbance and smothering of seabed habitats. However, the maintenance dredge will not overlap with the spawning grounds of lamprey which are further upstream in freshwater habitat. Both species are recorded in the estuary at other life stages with the growth phase of river lamprey primarily restricted to estuaries and both species also move through the estuary during spawning migrations. Therefore, given the high mobility of both river and sea lamprey (and also the parasitic fish prey of these species), lamprey will easily be able to avoid the zone of influence of the dredging and utilise other nearby areas with the footprint of dredging only represent a small proportion of the ranges of lamprey. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | Changes in water and sediment quality on migratory fish | Maintenance dredge and dredge disposal | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br><br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | No | Changes in water quality are also expected to be lower than for the capital dredge and at worst similar to existing maintenance dredging.<br><br>Sediment plumes resulting from dredging and dredge disposal are also considered to dissipate rapidly and be immeasurable against background levels within a short duration of time. Therefore, lamprey would also be able to avoid the temporary sediment plumes. Based on these factors there is therefore considered limited potential for migrating fish to be adversely affected by the predicted changes in SSC.<br><br>With respect to sediment contamination, generally low levels of contamination were found in the sediment contamination samples as presented in the Water and Sediment Quality assessment in **Chapter 17: Marine Water and Sediment Quality [APP-059]**).<br><br>Based on this sampling data, the overall level of contamination in the proposed dredge area is considered to be low and the sediment plume would be expected to rapidly dissipate by the strong tidal currents in the area. Significant elevations in the concentrations of contaminants within the water column are not anticipated.<br><br>This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | Underwater noise effects on migratory fish | Vessel operations including maintenance dredge and dredge disposal | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | No | During the operational phase there is the potential for noise disturbance to lamprey species as a result of vessel movements. The worst-case source level associated with vessels during operation is the same as for dredging activity. The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Only mild behavioural responses for lamprey species in relative proximity to operational vessels are anticipated with noise levels unlikely to be discernible above ambient levels in the wider Humber Estuary area given the high levels of existing background vessel noise in the area. Furthermore, the additional operational vessel movements resulting from the Project will only constitute a small increase in vessel traffic in the area (approximately a 3% increase alone and 6% with the IERRT project). This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Lighting effects on migratory fish and seals | Vessel and berth operations | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important | No | With respect to potential lighting effects, the jetty will be lit for safety and operational purposes.<br>Beams of light from operational lighting will largely be restricted to the surface waters as light is unlikely to penetrate far into the water column given the high turbidity of the Humber Estuary. Furthermore, evidence suggest that lamprey are not considered to be particularly sensitive to lighting and will often be |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas.<br>Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast | | attracted to lighting rather than causing a barrier to movements (Ref 1-20 and Ref 1-21). Therefore, such localised changes would not cause disruption or blocking of migratory routes for these species. Seals are also known to forage in areas with artificial lighting (such as harbours, offshore wind farms and fish farms) with lighting not known to cause adverse effects in this species. Rather than disrupting any foraging movements, lighting might also have some minor and localised beneficial effects given that lighting has been shown to aggregate fish shoals and will also potentially improve foraging efficiency through enhancing vision of this predator near the surface. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Underwater noise effects on marine mammals | Maintenance dredge, dredge disposal and vessel operations | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* | No | During the operational phase there is the potential for noise disturbance to grey seal species as a result of vessel movements. The worst-case source level associated with vessels during operation is the same as for dredging activity. The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). Only mild behavioural responses for seals in relative proximity to operational vessels are anticipated with |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | | noise levels unlikely to be discernible above ambient levels in the wider Humber Estuary area given the high levels of existing background vessel noise in the area. Furthermore, the additional operational vessel movements resulting from the Project will only constitute a small increase in vessel traffic in the area (approximately a 3% increase alone and 6% with the IERRT project). This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Visual disturbance of hauled out seals | Vessel operations, maintenance dredge and dredge disposal | Criterion 3 – supports populations of plants and/or animal species of international importance:<br><br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | No | The nearest established breeding colony for grey seals is located over 25km away at Donna Nook. Approximately ten to 15 grey seals were also observed hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary) during recent benthic surveys as detailed in Ref 1-26. This haul out site is located approximately 4km north east from the Project. No seal haul out sites are known to occur nearer to the Project.<br><br>Seals which are hauled out on land, either resting or breeding, are considered particularly sensitive to visual disturbance (Ref 1-27).<br><br>The level of response of seals is dependent on a range of factors, such as the species at risk, age, weather conditions and the degree of habituation to the disturbance source. Hauled out seals have been recorded becoming alert to powered craft at distances of up to 800m although seals generally |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | | | only disperse into the water at distances <150-200m (Ref 1-28; Ref 1-29; Ref 1-30; Ref 1-31). For example, in a study focusing on a colony of grey seals on the South Devon coast, vessels approaching at distances between 5m and 25m resulted in over 64% of seals entering the water, but at distances of between 50m and 100m only 1% entered the water (Ref 1-32). Recent disturbance research has also found no large-scale redistribution of seals after disturbance with most seals returning to the same haul out site within a tidal cycle (Ref 1-33).<br><br>Based on this evidence, seals hauled out on the intertidal habitats of Sunk Island (located on the opposite bank to the Project) are out of the zone of influence of any potential visual disturbance effects as a result of maintenance dredging and vessel operations. This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Collision risk to marine mammals | Vessel operations | Criterion 3 – supports populations of plants and/or animal species of international importance:<br><br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the | No | Vessels using the berths during operation will be typically approaching at slow speeds (2-4 knots) and maintenance dredging/dredge disposal will be mainly stationary or travelling at low speeds (2-6 knots), making the risk of collision very low. Although all types of vessels may collide with marine mammals, vessels traveling at speeds over ten knots are considered to have a much higher probability of causing lethal injury (Ref 1-23). |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | | Furthermore, the region is already characterised by heavy shipping traffic. The additional operational vessel movements resulting from the Project will only constitute a small increase in vessel traffic in the area on a typical day. There will also be periodic maintenance dredger and barge movements.<br><br>In general, incidents of mortality or injury of marine mammals caused by vessels remain a relatively rare occurrence in UK waters (Ref 1-24; Ref 1-25). For example, out of 144 post mortem examinations carried out on cetaceans in 2018, only two (1.4%) were attributed to boat collision with the biggest causes of mortality including starvation and by-catch, although some incidents are likely to remain unreported (Ref 1-25). In addition, marine mammals frequently foraging within the region will routinely need to avoid collision with vessels and are, therefore, considered adapted to living in an environment with high levels of vessel activity. T This impact pathway is therefore, not considered further in the Shadow HRA alone. In addition, in-combination effects are considered to be negligible and not of a magnitude to cause a LSE. |
| | Potential mortality or injury to coastal waterbirds as a result of flare stacks | Flare stack operation | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl - 153,934 waterfowl (five | No | Flare stacks have the potential to cause incidental mortality to birds during nocturnal periods with the flame emitted during a flaring event known to attract birds in some situations. Most incidents reported have been as a result of birds using the structures as a nocturnal roosting perch and/or birds attracted |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage) | | to the illumination of the flare during migratory movements.<br><br>It should be noted that evidence suggests that effects on birds have been recorded as a result of flare stacks associated with offshore oil and gas platforms or refineries (Ref 1-41). These structures have very large open flames that are active as part of normal operations. In contrast, the flare stacks proposed as part of the Project will be much smaller in comparison, with the flame largely enclosed as a result of shrouding. Furthermore, they are only required to be used during start up, shut down and emergency use (typically less than 5 % of the time annually).<br><br>In addition, no supporting terrestrial habitat for SPA species occurs within the Project boundary. Furthermore, the SPA waterbird species screened in **(Table 2)** are not known to use stacks or other similar structures in industrial areas of the Humber Estuary for roosting. In addition, the locations where the flare stacks will be installed (in the East Site-Ammonia Storage, East Site-Hydrogen Production Facility and West Site) are not in a known flight path route between the foreshore and nearby functionally linked land areas with flight path survey data |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | | | suggesting only very limited flights occur (during winter, migratory passage and summer months) (Ref 1-42). Flare stacks are also a feature of the industrial landscape in the local area with local populations of SPA birds considered accustomed to these features with no evidence to suggest that local populations have been affected by flare stacks from nearby refineries.<br><br>Based on all these considerations, the risk of flare stacks causing injury or morality is considered to be negligible and will not result in a LSE to any waterbird features alone or in-combination. |
| | Direct changes to coastal waterbird foraging and roosting habitat as a result of marine infrastructure | Berth operations | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed | Yes | Marine infrastructure associated with the Project (raised jetty structure, linkspan etc.) could potentially cause direct damage or reduced functionality to waterbird feeding and roosting habitat. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2)**. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |
| | Airborne noise and visual disturbance to coastal waterbirds within the Ramsar boundary | Berth operations | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | Yes | During operation, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2)**. |

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | Lighting effects on coastal waterbirds during operation | Berth operations | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br><br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | No | Waders and other waterbirds feeding on intertidal mudflats are known to feed nocturnally. Evidence suggests that artificial illumination can improve foraging (through increasing prey intake rate) and can, therefore, lighting can have a positive effect on the nocturnal foraging of waterbirds (Ref 1-39). Artificial lighting has also been found in some situations to increase potential perceived predation risk in waders which can cause increased behavioural responses in areas with higher intensity illumination (Ref 1-40).<br><br>Further analysis suggests that operational lighting effects on the foreshore and Humber Estuary will be highly localised to the immediate vicinity of the jetty with light spill falling to 2 lux[5] within 7.5 m of the jetty and reaching levels consistent with current background illumination within 15 –20 m of the jetty.<br><br>On this basis, potential operational lighting effects are considered to be highly localised and of negligible magnitude not considered to result in a LSE to any waterbird features alone or in-combination. |

[5] For context, moonlight on a full moon can be up to 1-2 lux with direct sunlight over 100,000 lux (https://www.seratechnologies.com/what-is-lux-and-what-level-should-it-be).

| Phase | Impact Pathways/ Potential Effects | Project activity | Feature | Potential for LSE alone or in-combination | Justification |
|---|---|---|---|---|---|
| | | | | | |
| Decommissioning | Airborne noise and visual disturbance to coastal waterbirds within the Ramsar boundary | Landside decommissioning of the removal of pipe racks within Work Area 2 (the jetty access road) and plant and equipment on the approach jetty topside associated with hydrogen production (within Work Area 1). | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | Yes | During decommissioning, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds. There is, therefore, considered to be a potential for LSE on the waterbird features screened into the assessment **(Table 2)**. |

## 3.2. Transboundary Screening

3.2.1. Under Regulation 32 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations) and based on the information that ABP provided in the Scoping Report (Ref 1-44), PINS is of the view that the Project is likely to have a significant effect on the environment in a European Economic Area ("EEA") State (Ref 1-9).

3.2.2. In reaching this view, PINS has applied the precautionary approach as explained in PINS Advice Note 12 (Ref 1-9), and has taken into account the information supplied by ABP at the time of scoping.

3.2.3. In PINS' view, the trade routes associated with the Project, combined with the overlap of the Project with European/Ramsar sites, could lead to potential impacts on bird populations associated with EEA States (Ref 1-9).

3.2.4. The following species associated with populations in EEA states are interest features of the Humber Estuary SPA:

a. Red Knot (*Calidris canutus*) comprising 6.3% of the Northeastern Canada/Greenland/Iceland/North western Europe populations.

b. Black-tailed Godwit (*Limosa limosa*) comprising 2.6 to 3.2% of the Icelandic breeding population.

3.2.5. The following species associated with populations in EEA states are interest features of the Humber Estuary Ramsar:

a. Golden Plover representing 2.2% of the Iceland and Faroes/East Atlantic population

b. Black-tailed Godwit comprising 2.6 to 3.2% of the Iceland/West Europe populations.

3.2.6. On this basis, the EEA States of Iceland and Denmark have been notified of these potential transboundary issues by PINS.

3.2.7. While Knot is recorded on the foreshore in the Immingham area, the species is considered rare in the vicinity of the Project with no Knot recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project). The area is, therefore, considered to be of very limited functional value for the species and has been screened out. On this basis, there is considered to be no potential for an LSE on this interest feature either alone or in-combination with other plans and projects and, therefore, this interest feature is not considered further in the Shadow HRA.

3.2.8. Black-tailed Godwit are regularly recorded on the foreshore in the area of the proposed Project. As detailed in Table 4, there is considered to be a potential for LSE on these interest features both alone and in-combination with other plans and projects and, therefore, these interest features have been taken forward into the assessment stage of the Shadow HRA (**Section 4**).

3.2.9. While Golden Plover is widely distributed through the estuary, the species is considered rare in the vicinity of the Project with no Golden Plover recorded in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project). The area is, therefore, considered to be of very limited functional value for the species. On this basis, there is considered to be no potential for an LSE on this interest feature either alone or in-combination with other plans and projects and, therefore, this interest feature is not considered further in the Shadow HRA.

## 3.3. Screening Conclusion

3.3.1. The screening review has determined that there are likely significant effects on European/Ramsar sites and qualifying features as a result of the Project, both alone or in combination with other plans or projects, and an AA by the Competent Authority is therefore likely to be required. There is a requirement to progress to the next stage of the Shadow HRA (**Section 4**).

3.3.2. Considering all sites and impact pathways as detailed in Table 2, Table 3, Table 4 and Table 5 the Project has the potential to result in an LSE on the following European/Ramsar sites and features, and these have been taken forward into the Appropriate Assessment stage:

**Humber Estuary SAC**

a. H1110. Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks.

b. H1130. Estuaries.

c. H1140. Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats.

d. H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand (air quality effects only).

e. H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (air quality effects only).

f. S1095. *Petromyzon marinus*; Sea lamprey.

g. S1099. *Lampetra fluviatilis*; River lamprey.

h. S1364. *Halichoerus grypus*; Grey seal.

**The Wash and North Norfolk Coast SAC**

i. S1365. Harbour seal *Phoca vitulina*.

**Humber Estuary SPA:**

j. A048 *Tadorna tadorna*; Common Shelduck (Non-breeding).

k. A149 *Calidris alpina alpina*; Dunlin (Non-breeding).

l. A156 *Limosa limosa islandica*; Black-tailed Godwit (Non-breeding).

m. A162 *Tringa totanus*; Common Redshank (Non-breeding).

n. Waterbird assemblage.

**Humber Estuary Ramsar site:**

o. Criterion 1 – natural wetland habitats that are of international importance.

p. Criterion 3 – supports populations of plants and/or animal species of international importance.

q. Criterion 5 – Bird Assemblages of International Importance.

r. Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance.

s. Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path.

3.3.3. The Greater Wash SPA was screened out of Stage 2 (Appropriate Assessment) as summarised in Table 2**.**

3.3.4. It should be noted that with respect to maintenance dredging, this will only potentially be required in the same way as currently occurs at the Port of Immingham with the same dredging techniques used. The modelling of the scheme (as reported in **Chapter 16: Physical Processes [APP-058]**) indicates that the berth pocket, once dredged, will remain swept clear of deposited material by the flood and ebb tidal flows (in much the same way the existing Immingham Oil Terminal berths are). Consequently, the need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all).

3.3.5. Should maintenance dredging be required it is proposed to be incorporated within the maintenance dredge licence for Immingham (L/2014/00429/1) as part of the renewal of the licence at the end of 2025.

3.3.6. If maintenance dredging for the Project is required periodically this will be carried out in line with the existing regime. The frequency and volume of material deposited at the disposal site from each load (for maintenance dredging across the port) will not change compared with current maintenance dredging activities as the same plant and methods are proposed to be used. Furthermore, the volume of material that will need to be maintenance dredged from the berth pocket will be lower than the volumes of capital dredge material. Overall, the changes brought about as a result of the maintenance dredge and disposal of maintenance dredge material during operation will be comparable to those which already arise from the ongoing maintenance of the existing Port of Immingham berths. Therefore, it is considered that the likely impacts on marine receptors as a result of maintenance dredging will be comparable to the existing maintenance dredge regime. The magnitude of potential impacts are also considered to be lower than the capital dredge. There is, therefore, considered to be no potential for LSE to result on the interest feature either alone or in-combination with other plans and projects with respect to pathways relating to sediment deposition, water quality, changes to physical processes and underwater noise as summarised in Table 3, Table 4 and Table 5. However, there is considered to be the potential for an LSE due to potential habitat changes resulting from the removal of seabed material during maintenance dredging (given that the dredge footprint has not previously been subject to maintenance dredging).

# 4. Stage 2 – Appropriate Assessment

## 4.1. Overview

4.1.1. In accordance with PINS Advice Note 10 (Ref 1-9), at Stage 1, ABP (as the applicant) has concluded that LSE on European site(s) and qualifying features are considered to exist, either alone or in combination with other plans or projects and an AA by the Competent Authority is likely to be required. In line with this guidance the assessment has documented Stage 1 (in **Section 3** above) and now moves to Stage 2 (AA) (this **Section 4**).

4.1.2. This second stage of the Shadow HRA involves undertaking an assessment of the potential effects on the integrity of the European/Ramsar sites and interest features that have been screened into the assessment in view of the site's conservation objectives (see Table 6). Where there are potential adverse effects, a review of mitigation options is carried out and mitigation measures are identified with a view to avoiding or minimising the effects. If, despite the identified measures of mitigation, there still remains a potential AEOI, the Shadow HRA must progress to Stage 3.

4.1.3. The potential effects on interest features of European/Ramsar sites that have been screened into the AA (see **Section 3.3**) have been reviewed and are presented in this section. This assessment has been carried out in the context of the nature and scale of the proposed Project, the geographic location relative to the interest features of European/Ramsar sites and the ecology, behaviour and sensitivities of the interest features to these environmental pressures/changes.

4.1.4. PINS Advice Note 10 (Ref 1-9) recommends that all relevant information is presented in a summary table which identifies all European sites and qualifying features and each pathway of effect which has been considered at each HRA Stage (screening, AA/IROPI and the derogations, as applicable). It is recommended that this exercise is undertaken for each phase of the Project (construction, operation, decommissioning, as relevant). A summary table containing this information is provided in **Appendix D** of this Shadow HRA.

**Table 6: Qualifying interest features screened into the assessment and conservation objectives of European/Ramsar sites**

| Site | Features Screened In | Conservation Objectives |
|---|---|---|
| Humber Estuary SAC | • H1110. Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks;<br>• H1130. Estuaries;<br>• H1140. Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats;<br>• H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand<br>• H1330. Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (air quality effects only);<br>• S1095. *Petromyzon marinus*; Sea lamprey;<br>• S1099. *Lampetra fluviatilis;* River lamprey; and<br>• S1364. *Halichoerus grypus*; Grey seal. | With regard to the natural habitats and/or species for which the site has been designated, and subject to natural change:<br>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status[6] of its Qualifying Features, by maintaining or restoring;<br>• The extent and distribution of qualifying natural habitats and habitats of qualifying species;<br>• The structure and function (including typical species) of qualifying natural habitats;<br>• The structure and function of the habitats of qualifying species;<br>• The supporting processes on which qualifying natural habitats and habitats of qualifying species rely;<br>• The populations of qualifying species; and<br>• The distribution of qualifying species within the site. |

[6] Natural England has advised that they do not currently undertake a specific condition assessment of the Humber Estuary European sites. Instead, Natural England advised that the condition assessment for the Humber Estuary Site of Special Scientific Interest (SSSI) should be used where the SSSI features are the same as the European Marine Site features to give the conservation status. Habitat, lamprey and grey seal features of the SAC have not been recorded in the conservation status of the Humber Estuary SAC.

| Site | Features Screened In | Conservation Objectives |
|---|---|---|
| The Wash and North Norfolk Coast | • 1365. Harbour seal *Phoca vitulina.* | With regard to the natural habitats and/or species for which the site has been designated, and subject to natural change:<br>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;<br>• The extent and distribution of qualifying natural habitats and habitats of qualifying species;<br>• The structure and function (including typical species) of qualifying natural habitats;<br>• The structure and function of the habitats of qualifying species;<br>• The supporting processes on which qualifying natural habitats and habitats of qualifying species rely;<br>• The populations of qualifying species; and<br>• The distribution of qualifying species within the site. |
| Humber Estuary SPA | • A048 *Tadorna tadorna*; Common Shelduck (Non-breeding);<br>• A149 *Calidris alpina alpina*; Dunlin (Non-breeding);<br>• A156 *Limosa limosa islandica;* Black-tailed Godwit (Non-breeding);<br>• A162 *Tringa totanus;* Common Redshank (Non-breeding); and<br>• Waterbird assemblage. | With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified, and subject to natural change:<br>Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;<br>• The extent and distribution of the habitats of the qualifying features;<br>• The structure and function of the habitats of the qualifying features;<br>• The supporting processes on which the habitats of the qualifying features rely;<br>• The population of each of the qualifying features; and<br>• The distribution of the qualifying features within the site. |

| Site | Features Screened In | Conservation Objectives |
|---|---|---|
| Humber Estuary Ramsar site | • Criterion 1 – natural wetland habitats that are of international importance;<br>• Criterion 3 – supports populations of plants and/or animal species of international importance;<br>• Criterion 5 – Bird Assemblages of International Importance;<br>• Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance; and<br>• Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path. | For Ramsar sites, a decision has been made by Defra and Natural England not to produce Conservation Advice packages, instead focussing on the production of High Level Conservation Objectives. As the provisions on the Habitats Regulations relating to HRAs extend to Ramsar sites, Natural England considers the Conservation Advice packages for the overlapping European Marine Site designations to be, in most cases, sufficient to support the management of the Ramsar interests.<br>See the conservation objectives for Ramsar interest features covered by overlapping the Humber Estuary SAC and Humber Estuary SPA. |
| * Denotes a priority natural habitat or species | | |

Source: JNCC (Ref 1-45, Ref 1-46); Natural England (Ref 1-47; Ref 1-48; Ref 1-49; Ref 1-11).

## 4.2. Assessment of Effects

4.2.1. The assessment has been structured based on the following key impact pathways screened into the AA. The AA has taken a pathway approach to grouping potential effects but to provide clarity it should be noted that all pathways are construction related with the exception of the pathways in italics which are operational and in italics/underlined which are decommissioning:

a. Section 4.3: Physical loss of habitat and associated species:

   i. The potential effects of the direct loss of qualifying intertidal habitat.

   ii. The potential effects of the direct loss of supporting intertidal habitat on qualifying species.

   iii. The potential effects of the direct loss of qualifying subtidal habitat features.

   *iv. The potential effects due to changes to waterbird foraging and roosting habitat as a result of the presence of marine infrastructure during operation on qualifying species.*

b. Section 4.4: Physical damage through disturbance and/or smothering of habitat:

   i. The potential effects of changes to qualifying habitats as result of the removal of seabed material during capital dredging.

   ii. The potential effects of changes to qualifying habitats as a result of sediment deposition during capital dredging.

   iii. The potential effects of changes to qualifying habitats as a result of sediment deposition during capital dredge disposal.

   *iv. The potential effects of changes to qualifying habitats as result of the removal of seabed material during maintenance dredging.*

c. Section 4.5: Physical loss or damage of habitat through alterations in physical processes:

   i. Indirect loss or change to qualifying habitats (and supporting habitats) and qualifying species as a result of changes to hydrodynamic and sedimentary processes as a result of the marine works.

   ii. Indirect changes to qualifying habitats as a result of changes to hydrodynamic and sedimentary processes during capital dredge disposal.

d. Section 4.6: Direct changes to qualifying habitats beneath marine infrastructure due to shading:

   *i. Direct changes to qualifying habitats beneath marine infrastructure due to shading.*

e. Section 4.7: Physical change to habitats resulting from the deposition of airborne pollutants:

   *i. Physical change to qualifying habitats resulting from the deposition of N and NOx from marine vessel and landside plant emissions during operation*

f. Section 4.8: Non-toxic contamination through elevated SSC:

   i. The potential effects of elevated SSC during capital dredging on qualifying habitats and species.

   ii. The potential effects of elevated SSC during capital dredge disposal on qualifying habitats and species.

g. Section 4.9: Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases:

   i. The potential effects of the release of contaminants during capital dredging on qualifying habitats and species.

   ii. The potential effects of the release of contaminants during capital dredge disposal on qualifying habitats and species.

h. Section 4.10: Airborne noise and visual disturbance:

   i. The potential effects of airborne noise and visual disturbance during construction (including capital dredging) on qualifying species of coastal waterbird within the SPA/Ramsar boundary.

   *ii. The potential effects of airborne noise and visual disturbance during operation on qualifying species of coastal waterbird within the SPA/Ramsar boundary*

   *iii. <u>The potential effects of airborne noise and visual disturbance during decommissioning on qualifying species of coastal waterbird within the SPA/Ramsar boundary</u>*

i. Section 4.11: Disturbance through underwater noise and vibration:

   i. The potential effects of underwater noise and vibration during marine piling on qualifying species of fish and marine mammals.

   ii. The potential effects of underwater noise and vibration during capital dredge and dredge disposal on qualifying species of fish and marine mammals.

j. Section 4.12: Biological disturbance due to potential introduction and spread of non-native species:

   i. The potential effects of the introduction and spread of non-native species during construction, capital dredging and dredge disposal on qualifying habitats.

   *ii. The potential effects of the introduction and spread of non-native species during operation on qualifying habitats.*

k. Section 4.13: Changes to foraging and behaviour due to artificial lighting:

   i. Lighting effects on coastal waterbirds during construction.

4.2.2. Each of the above pathways has then been structured based on the following sub-sections:

a. ***General scientific context:*** A review of the best available scientific evidence on the pathway to provide contextual information.

b. ***Summary of potential effects:*** This section provides a description of the potential effects on receptors relevant to the qualifying feature.

c. ***Mitigation:*** For those pathways for which mitigation is required a description of the measures will be provided.

d. ***Assessment of the potential for an AEOI:*** The potential residual effects will be considered in the context of relevant conservation objectives for the particular qualifying feature and the best scientific evidence on the pathway to reach a conclusion on the potential for an AEOI.

4.2.3. The information presented in this report relating to each pathway should also be reviewed in the context of the baseline information provided in **Appendix A**.

4.2.4. Consideration of intra-project combined effects is provided in **Section 4.14** of this Shadow HRA.

4.2.5. An in-combination assessment considering other relevant plans/projects is then provided in **Section 4.15** of this Shadow HRA.

## 4.3. Physical Loss of Habitat And Associated Species

**The potential effects of the direct loss of qualifying intertidal habitat**

*General scientific context*

4.3.1. The impact of direct habitat loss can involve building over marine habitats (such as reclamation) or the permanent physical removal of substratum and associated organisms from the seabed. Direct habitat loss can also occur due to deepening as a result of dredging causing a change from an intertidal to a subtidal environment.

4.3.2. Intertidal habitats are sensitive to physical loss at locations where new structures are introduced onto the seabed (i.e., within the development 'footprint' of these structures). The significance of such losses will vary on a site-by-site basis in response to differences in the extent and duration of the losses as well as the relative value of the habitats in question. The value of the habitats is, in turn, reflected by the species that are present and level of statutory and non-statutory protection afforded to them. As any effects are very much dependent upon site specific considerations, a generic scientific review is not appropriate in this case and the focus of the assessment is based on site-specific considerations.

*Summary of effects*

4.3.3. The maximum parameters for the piles will cause a direct loss of up to 0.0021 ha of intertidal mudflat habitat as a worst case assessment. The mudflat in the Immingham area is considered typical of that found more widely in the outer Humber Estuary (Section 1.3 of Appendix A).

4.3.4. Intertidal habitat loss as a result of the marine piling represents approximately 0.000006% the Humber Estuary SAC and approximately 0.000022% of the 'mudflats and sandflats not covered by seawater at low tide' feature of the Humber Estuary SAC[7].

4.3.5. This loss also represents 0.000006% of the Humber Estuary SPA/Ramsar[8]. When considering this in the context of intertidal area, the area of loss represents approximately 0.000024% of intertidal foreshore habitats[9] and approximately 0.000033% of mudflat[10] within the SPA.

4.3.6. This habitat loss is therefore negligible in the context of the Humber Estuary SAC, SPA and Ramsar. The direct intertidal habitat loss is not a continuous and solid footprint (such as a reclamation) with each pile instead representing discrete and highly localised point features with large spaces of open mudflat habitat between each of the piles. These patches of mudflat between the piles and also mudflat habitat more widely in the local area will not be altered as a result of the habitat loss. Typical ecological functioning of the mudflat will continue with natural processes associated with maintaining mudflat community composition such as larval dispersal and colonisation not obstructed. As a result, no wider changes in the abundance and diversity of infaunal communities are expected. It should also be noted that no notable differences in key ecological mudflat parameters (such as elevation or sediment type) have been observed around other open piled jetty structures in the Humber region and as such are not predicted for this Project.

4.3.7. In summary, the loss of intertidal habitat due to marine piling is *de minimis* in extent and considered ecologically inconsequential given the negligible contribution that a loss of this type and magnitude has for the overall structure and functioning of the wider intertidal habitat feature. Potential effects of direct intertidal habitat loss on coastal waterbirds are considered in **paragraphs 4.3.10 to 4.3.18 of the Shadow HRA**.

*Mitigation*

4.3.8. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.3.9. As outlined above the loss of intertidal habitat due to marine piling will be highly localised and considered *de minimis* in extent in the context of the amount of similar habitat in the region (and as a proportion of the SAC/Ramsar site). On this basis any change to the '*extent and distribution of qualifying natural habitats*' is considered ecologically inconsequential **(**see Table 7), and the predicted effects are not considered to compromise any of the conservation objectives for the SAC/Ramsar Site. It is therefore concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

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7 Based on the extents given in the Standard Data Form on the JNCC website (Ref 1-45))
8 Based on the extents given in the Standard Data Form on the JNCC website (Ref 1-46)
9 Based on using the 'Intertidal Substrate Foreshore (England and Scotland)' data layer (Ref 1-11).
10 Based on using mudflat data layer of the Priority Habitat Inventory (England) (Ref 1-50).

**Table 7: The potential for an AEOI due to the direct loss of qualifying intertidal habitat**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1140: Mudflats and sandflats not covered by seawater at low tide | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | The potential effects have been considered in the context of the site's conservation objectives as well as the respective targets of these conservation objectives (as provided in the Supplementary Advice on Conservation Objectives (SACOs). |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | The loss of intertidal habitat is de minimis in extent and considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SAC/Ramsar site). On this basis any change to the '*extent and distribution of qualifying natural habitats'* conservation objective and associated targets in terms of maintaining '*the presence and spatial distribution of mudflat and sandflat communities*' or restoring '*the total extent, spatial distribution and types of mudflats and sandflats*' is considered ecologically inconsequential both locally and more widely across the Humber Estuary site.<br><br>A loss on this scale is also considered to be insignificant in terms of 'the structure and function (including typical species) of qualifying natural habitats' conservation objective. In this respect, the loss is considered to have no material consequences in terms of the '*presence and abundance of key structural and influential species'* target with the loss not considered to prevent key species from being a viable component of mudflat habitat in the local area. Furthermore, other targets relating to structure and function in terms of maintaining species composition, sediment composition and Total Organic Carbon (TOC) content in the local area or more widely across the Humber Estuary site will not be altered due habitat loss on this scale.<br><br>Direct loss of intertidal due to the piles is considered to be insignificant in terms of '*supporting processes on which qualifying natural habitats rely*' conservation objective with any changes to associated targets relating to wave exposure, physico-chemical properties, sediment movement, hydrodynamic regime, sediment quality and water quality parameters considered to be negligible and ecologically inconsequential on mudflat habitat in the Immingham area and more widely across the Humber Estuary site. |

**The potential effects of the direct loss of supporting intertidal habitat on qualifying species**

*General scientific context*

4.3.10. The quality of intertidal habitat as a feeding resource for waterbirds can be highly variable both spatially and temporally (Ref 1-51). Higher energetic costs for waterbirds could occur in areas where habitat change has caused a reduction in prey distribution and density. This may affect local populations in the long-term through impacts on individual fitness (survival, body condition and fecundity) (Ref 1-52).

4.3.11. Habitat loss can also result in increased densities of birds already using a site, increasing the potential for interference competition (Ref 1-53; Ref 1-52). Loss of intertidal habitat could displace birds and cause them to redistribute either locally or to neighbouring sites (Ref 1-54). This in turn might affect the birds at those sites through competition and density-dependent mortality. Redshank displaced following the construction of an amenity barrage at Cardiff Bay (South Wales), for example, experienced a poorer body condition and had a lower survival rate after they moved (Ref 1-55). Lambeck (Ref 1-56) found that Oystercatchers displaced following large-scale habitat loss in the Delta region of The Netherlands experienced significantly higher mortality than those originally ringed elsewhere in the Delta, it is presumed as a result of the increased densities in recipient areas.

*Summary of effects*

4.3.12. The maximum parameters for the piles will cause a direct loss of up to 0.0021 ha of intertidal mudflat habitat as a worst case assessment.

4.3.13. The loss of habitat represents approximately 0.000006% of the Humber Estuary SPA/Ramsar[11]. When considering this in the context of intertidal, the area of loss represents approximately 0.000024% of intertidal foreshore habitats[12] and approximately 0.000033% of mudflat[13] within the SPA/Ramsar.

4.3.14. This habitat loss is therefore clearly negligible in the context of the Humber SPA and Ramsar.

4.3.15. The loss of habitat due to marine piling will also be highly localised and considered *de minimis* in extent. The loss is also considered to be a magnitude that will not change the overall structure or functioning of the nearby mudflats within the Port of Immingham area or more widely in the Humber Estuary.

4.3.16. On this basis, any change to prey resources for birds feeding in the local area will be negligible. Individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) will not be affected.

[11] Based on the extents given in the Standard Data Form on the JNCC website (Ref 1-46)
[12] Based on using the 'Intertidal Substrate Foreshore (England and Scotland)' data layer (Ref 1-11).
[13] Based on using mudflat data layer of the Priority Habitat Inventory (England) (Ref 1-50).

*Mitigation*

4.3.17. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.3.18. As outlined above the loss of intertidal habitat due to marine piling will be highly localised and considered *de minimis* in extent. On this basis, any resulting change to waterbird distribution or prey resources for birds feeding in the local area will be negligible. Individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) will not be affected. The predicted effects are not considered to compromise any of the conservation objectives (see Table 8) and it is therefore concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

## Table 8: The potential for an AEOI due to the direct loss of supporting intertidal habitat on qualifying species

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SPA | A048; Common Shelduck (Non-breeding) *Tadorna tadorna* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | The potential effects have been considered in the context of the site's conservation objectives.<br>The predicted intertidal habitat loss will not cause changes to '*the populations of each of the qualifying features'* conservation objective. This is because the scale of loss is not considered to be of a magnitude that would cause changes to the diet or prey consumption of species so that individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) are affected.<br>The '*distribution of the qualifying features within the site'* conservation objective will not be affected as the predicted loss is *de minimis* in extent and of a scale that would not cause changes in local distribution.<br>This loss is considered negligible in the context of available feeding habitat even at a local scale along the eastern frontage of the port. The effects of the habitat loss will also be highly limited in terms of the overall wider functionality of the local mudflats for feeding birds. On this basis, any change to the '*structure and function of the habitats of the qualifying features'* conservation objective is considered ecologically inconsequential.<br>The loss in intertidal habitat is considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SPA/Ramsar). On this basis any change to the '*extent and distribution of the habitats of the qualifying features'* conservation objectives is considered ecologically inconsequential. |
| | A149: Dunlin *Calidris alpina alpina* (Non-breeding) | | |
| | A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding) | | |
| | A162: Common Redshank *Tringa totanus* (Non-breeding) | | |
| | Waterbird assemblage | | |
| Humber Estuary Ramsar site | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | | |
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |

**The potential effects of the direct loss of qualifying subtidal habitat**

*General scientific context*

4.3.19. The impact of direct habitat loss can involve building over marine habitats (such as reclamation) or the permanent physical removal of substratum and associated organisms from the seabed.

4.3.20. Subtidal habitats are sensitive to physical loss at locations where new structures are introduced onto the seabed (i.e., within the development 'footprint' of these structures). The significance of such losses will vary on a site-by-site basis in response to differences in the extent and duration of the losses as well as the relative value of the habitats in question. The value of the habitats is, in turn, reflected by the species that are present and level of statutory and non-statutory protection afforded to them. As any effects are very much dependent upon site specific considerations, a generic scientific review is not appropriate in this case and the focus of the assessment is based on site-specific considerations.

*Summary of effects*

4.3.21. Marine piling in the subtidal area (based on the maximum parameters assessed) will result in the direct loss of up to 0.059 ha of seabed habitat as a worst case assessment. This habitat represents approximately 0.00016% of the Humber Estuary SAC.

4.3.22. The project-specific subtidal survey (Section 1.3 of **Appendix A**) recorded a highly impoverished assemblage characterised by polychaetes (such *Nephtys* spp, *Streblospio shrubsolii* and *Scoloplos armiger*), nematodes, oligochaetes *Tubificoides* spp and crustacean *Diastylis rathkei)*.

4.3.23. The loss in subtidal habitat as a result of the piles is considered negligible in the context of extent of the overall amount of similar marine habitats found locally in the Humber Estuary. All the species recorded were considered commonly occurring and not protected. Furthermore, faunal assemblage recorded are also considered characteristic of subtidal habitats found more widely in this section of the Humber Estuary (Ref 1-57; Ref 1-58; Ref 1-59).

4.3.24. The loss of subtidal habitats due to marine piling will be highly localised. The *de minimis* changes in subtidal habitat extent is of a magnitude which will not change the overall structure or functioning of the subtidal habitats within the Port of Immingham area or more widely in the Humber Estuary SAC.

*Mitigation*

4.3.25. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.3.26. As outlined above and within Table 9, the scale of predicted loss of subtidal habitat is considered inconsequential in the context of the amount of similar habitat in the region and as a proportion of the SAC/Ramsar**.** The predicted effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 9: The potential for an AEOI due to the direct loss of qualifying subtidal habitat**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1130: Estuaries | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | The potential effects have been considered in the context of the site's conservation objectives as well as the respective targets of these conservation objectives (as provided in the SACOs). |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | The loss of subtidal habitat is de minimis in extent and considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SAC/Ramsar site). On this basis any change to the '*extent and distribution of qualifying natural habitats*' conservation objective and associated targets in terms of maintaining '*the presence and spatial distribution of estuary communities'* or restoring '*the total extent, spatial distribution of the estuary to ensure no loss of integrity, while allowing for natural change and succession'* is considered ecologically inconsequential both locally and more widely across the Humber Estuary site.<br>A loss on this scale is also considered to be insignificant in terms of '*the structure and function (including typical species) of qualifying natural habitats'* conservation objective. In this respect, the loss is considered to have no material consequences in terms of targets associated with structure and function including restoring connectivity, the presence and abundance of key structural and influential species, maintaining freshwater flow, habitat zonation, estuary morphology, sediment regime, species composition of component communities, substrate composition/distribution, tidal regime, topography and water density.<br>Direct loss of subtidal due to the piles is considered to be insignificant in terms of the '*supporting processes on which qualifying natural habitats rely'* conservation objective with any changes to associated targets relating to sediment contaminants and water quality parameters considered to be negligible and ecologically inconsequential on mudflat habitat in the Immingham area and more widely across the Humber Estuary site. |

**The potential effects due to changes to waterbird foraging and roosting habitat as a result of the presence of marine infrastructure during operation on qualifying species**

4.3.27. For clarity it should be noted that this pathway relates to potential changes to foraging and roosting habitat as a result of the physical presence of marine infrastructure during operation of the Project. The potential effects of the direct loss of intertidal habitat on qualifying species is assessed in **Paragraphs 4.3.10 to 4.3.18.**

4.3.28. It should also be noted that this pathway specifically relates to the structures themselves rather than human activity on the infrastructure which is assessed in **Section 4.10**. However, it is acknowledged that such effects are likely to some extent to be interrelated.

*General scientific context*

4.3.29. Any port and harbour development has the potential to cause reduced functionality to waterbird feeding and roosting habitat due to port infrastructure.

4.3.30. Waterbirds often show a preference for foraging in open spaces with clear sightlines when feeding so that scanning distances can be maximised. On this basis, certain species of coastal waterbirds might show a reluctance to approach tall anthropogenic structures or those that create enclosed spaces. One of the main reasons for not approaching a structure is thought to be the same as waders avoiding feeding near high banks, tall hedges/trees and in enclosed spaces (such as small fields surrounded by trees) (Ref 1-60), i.e., they are trying to avoid any sudden attack by a predator that may be hiding in or behind the structure. Just as raptors often exploit tall structures to aid prey detection, species that may be targeted by raptors would naturally avoid tall structures to minimise predation risk. Many waders and waterfowl may avoid areas in which their sightlines are reduced, even though in certain circumstances this may reduce the quantity of high-quality foraging habitat available to them or access to important roosting sites. However, it is often difficult to separate the direct impact of the structure from other factors associated with development, such as human activity causing potential disturbance stimuli (see **Section 4.10**) (Ref 1-61).

4.3.31. The addition of anthropogenic structures to coastal waters can also result in a new habitat for colonising epibiota (such as mussels, periwinkles, limpets and barnacles) which are considered prey items for certain wading birds such as Turnstone, Oystercatcher and Purple Sandpiper. Certain species (such as Turnstone) are also regularly recorded feeding on epifaunal species which have colonised anthropogenic structures in the intertidal such as jetties and coastal defences (Ref 1-62).

4.3.32. Coastal waterbirds also regularly roost on a variety of artificial structures in harbours and ports including pontoons, platforms, sea walls and dolphins (mooring structures) (Ref 1-63; Ref 1-64; Ref 1-65). Species commonly recorded in the UK using such structures include gulls, Cormorants and waders such as Dunlin, Turnstone and Oystercatchers. Factors that can influence the level of use by waterbirds of artificial roosting structures include the proximity to nearby feeding grounds, the level of human disturbance and perceived predator risk.

*Summary of effects*

4.3.33. Marine infrastructure associated with the Project (raised jetty structure etc.), will not prevent any direct access to established roosting habitat used by coastal waterbirds in the area. In addition, shading caused by the structures would not be expected to cause significant changes to benthic prey resources used by coastal waterbirds as considered further in **Section 4.6** of this assessment.

4.3.34. The approach jetty will be an open piled structure with large gaps between each of the piles and between the jetty deck and the foreshore seabed (i.e. the mudflat surface). This will minimise the enclosed feel and allow birds feeding near the structure to maintain sightlines. It should be noted that observations from the ornithology surveys in the area suggest that birds regularly feed in very close proximity to both the Eastern Jetty (approximately 1km from the Project) and the Immingham Oil Terminal approach jetty (approximately 500m from the Project) – which are both similar open piled structures - with species such as Redshank, Dunlin, Turnstone regularly recorded underneath jetties and Curlew, Shelduck and Black-tailed Godwit approaching them closely (<10-20m). On this basis, birds would be expected to show similar highly localised responses to structures associated with the Project with responses ranging from no avoidance for some species to potentially some local avoidance (i.e. directly underneath or in close proximity) for other species. However, a review of bird distribution data for Sector C (for the period 2018/19 to 2021/22) found that the densities of coastal waterbirds (including Black-tailed Godwit, Shelduck, Dunlin and Redshank) were typically either higher or broadly comparable on the foreshore near to the existing IOT jetty (<100-150m) compared to greater distances away (approximately 150m to 1km). There is therefore unlikely to be a change the overall distribution of waterbirds more widely along the foreshore fronting Immingham in this area.

4.3.35. Based on the above, birds would be expected to feed below or very close to the Project's approach jetty and indeed other infrastructure on the foreshore - none of which will prevent direct access to established roosting habitat. As a consequence, any avoidance of marine infrastructure is expected to be limited (and highly localised) and is unlikely to change the overall distribution of waterbird assemblages more widely on the foreshore in the local area.

*Mitigation*

4.3.36. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.3.37. Potential effects on qualifying species screened in to the assessment is expected to be limited (and highly localised) and is unlikely to change the overall distribution of waterbird assemblages more widely on the foreshore in the local area (see above and **Table 10**). The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 10: The potential for an AEOI on qualifying species due to changes to waterbird foraging and roosting habitat as a result of the presence of marine infrastructure**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SPA | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br><br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Only very low numbers of Shelduck (< 10-20 individuals feeding during the winter months, and <10 individuals feeding outside the winter months and roosting, representing <1% of the estuary wide population numbers as described in **Table 2**) have been recorded on (or very close to[14]) the foreshore in the vicinity of the Project (i.e. within 400-500m). This below the 1 % threshold used by Natural England to determine potentially significant numbers.<br><br>In addition, relatively low numbers of Black-tailed Godwit have also been recorded (i.e. < 100 individuals, representing up to 2% of the estuary wide numbers as described in **Table 2**) on the foreshore in the vicinity of the Project (i.e. within 400-500m) during the winter months feeding. However, Natural England advised that birds exceeding 1% of the estuary-wide WeBS five-year mean peak is viewed as significant numbers. Numbers of roosting Black-tailed Godwit and numbers of Black-tailed Godwit feeding outside of the wintering months in this area are lower (representing <1% of the estuary wide population numbers as described in **Table 2**).<br><br>Based on the information provided above, these species would be expected to feed close to the approach jetty and other infrastructure on the foreshore (<10-20m). Furthermore, no established roosts which are considered important even on a local scale will be impacted. In addition, the raised jetty structure is considered unlikely to change the distribution of waterbirds more widely along the foreshore fronting Immingham in this area. It follows, therefore, that any avoidance of marine infrastructure is expected to be limited (and highly localised) and is unlikely to change the |

14 This species is typically recorded on the foreshore. Very low numbers (consisting of a few individuals) are also occasionally recorded floating on the water near the foreshore (< 50 m). This species is rarely recorded further offshore in this area.

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | overall distribution of waterbird assemblages more widely on the foreshore in the local area. As a consequence, any change to '*the distribution of the qualifying features within the site'* and '*structure and function of the habitats of the qualifying features*' conservation objectives are considered inconsequential.<br><br>The predicted effects are considered unlikely to cause any changes to '*the population of each of the qualifying features'* conservation objective because the scale of change is not of a magnitude that would cause changes to the diet or prey consumption of species so that individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) are affected. |
| | A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br><br>A162: Common Redshank *Tringa totanus* (Non-breeding) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Only very low numbers of Dunlin and Redshank (<100 Dunlin and <10-20 Redshank feeding during the winter months and <10 individuals feeding outside the winter months and roosting, representing <1% of the estuary wide population numbers as described in **Table 2**) have been recorded on the foreshore in the vicinity of the Project (i.e. within 400-500m). This is below the 1% threshold used by Natural England to determine potentially significant numbers.<br><br>Based on the information provided above, these species would be expected to feed under or very close to the approach jetty and other infrastructure on the foreshore with no direct access to established roosting habitat considered important even on a local scale impacted. Furthermore, the raised jetty structure is considered unlikely to change the distribution of waterbirds more widely along the foreshore fronting Immingham in this area. Therefore, any avoidance of marine infrastructure is expected to be limited (and highly localised) and is unlikely to change the overall distribution of waterbird assemblages more widely on the foreshore in the local area. As a consequence, any change to '*the* |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | *distribution of the qualifying features within the site'* and '*structure and function of the habitats of the qualifying features*' conservation objectives are considered inconsequential.<br><br>The predicted effects are considered unlikely to cause any changes to '*the population of each of the qualifying features'* conservation objective because the scale of change is not of a magnitude that would cause changes to the diet or prey consumption of species so that individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) are affected. |
| | Waterbird assemblage | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Turnstone is the only assemblage species known to feed and roost in numbers representing >1% of the estuary wide population numbers on the foreshore in the vicinity of the Project (i.e. within 400-500m) as described in **Table 2**. This species which feeds and roosts on upper shore boulders and sea defences is considered highly tolerant to disturbance and would be expected to continue roost and feed under the jetty. On this basis, no change to roosting or feeding habitat is anticipated for this species a result of the presence of marine infrastructure.<br><br>All other SPA assemblage species screened into the assessment have only been recorded roosting and feeding in very low abundances on the foreshore[15] in the vicinity of the Project (i.e. within 400-500m) (representing <1% of the estuary wide population numbers as described in **Table 2**). This is below the 1% threshold used by Natural England to determine potentially significant numbers.<br><br>Based on the information provided above, assemblage species would be expected to feed under or close to the approach jetty and other |

15 Very low numbers of Teal (<20-30 birds (representing <1% of the estuary wide WeBS five year mean peak)) are also occasionally recorded floating on the water near the foreshore (< 50 m). These birds are loafing rather than feeding. This species is rarely recorded further offshore in this area.

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | infrastructure on the foreshore (<10-20m) with no direct access to established roosting habitat considered important even on a local scale impacted. Furthermore, the raised jetty structure is considered unlikely to change the distribution of waterbirds more widely along the foreshore fronting Immingham in this area. Therefore, any avoidance of marine infrastructure is expected to be limited (and highly localised) and is unlikely to change the overall distribution of waterbird assemblages more widely on the foreshore in the local area. As a consequence, any change to '*the distribution of the qualifying features within the site'* and '*structure and function of the habitats of the qualifying features*' conservation objectives are considered inconsequential.<br><br>The predicted effects are considered unlikely to cause any changes to '*the population of each of the qualifying features'* conservation objective because the scale of change is not of a magnitude that would cause changes to the diet or prey consumption of species so that individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) are affected. |
| Humber Estuary Ramsar site | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on the information provided above, coastal waterbird features would be expected to feed under or close to the approach jetty and other infrastructure on the foreshore (<10-20m) with no direct access to established roosting habitat considered important even on a local scale impacted. Furthermore, the raised jetty structure is considered unlikely to change the distribution of waterbirds more widely along the foreshore fronting Immingham in this area. Therefore, any avoidance of marine infrastructure is expected to be limited (and highly localised) and is unlikely to change the overall distribution of waterbird assemblages more widely on the foreshore in the local area. As a consequence, any change to '*the distribution of the qualifying features within the site'* and '*structure and function of the habitats of the qualifying features*' conservation objectives are considered inconsequential. |
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage) | | |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | The predicted effects are considered unlikely to cause any changes to '*the population of each of the qualifying features'* conservation objective because the scale of change is not of a magnitude that would cause changes to the diet or prey consumption of species so that individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) are affected. |

## 4.4. Physical Damage through Disturbance and/or Smothering of Habitat

**The potential effects of changes to qualifying habitats as result of the removal of seabed material during capital dredging**

4.4.1. For clarity it should be noted this pathway relates to potential changes to subtidal and intertidal habitat as a result of the physical removal of sediment material from the seabed. The potential effects of the direct loss of intertidal habitat are assessed in **Section 4.3.** It should also be noted that this assessment specifically relates to the effects of the capital dredge. The need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). However, as this could cause disturbance to the seabed on a very periodic basis, changes to benthic habitats and species as result of the removal of seabed material during maintenance dredging is considered below in Paragraphs 4.4.29 to 4.4.35.

*General scientific context*

4.4.2. Dredging causes a direct physical removal of sediments, causing a modification to existing subtidal and intertidal habitats. This impacts benthic fauna associated with the dredged material including changes to abundance and distribution through damage, mortality or relocation to a disposal site, which may impact habitat quality.

4.4.3. The speed of recovery of the temporarily disturbed areas is dependent on the scale and timing of the disturbance, the life histories of species and the stability and diversity of the benthic community present. For example, while the opportunistic bivalve *Abra* spp. is vulnerable to physical disturbance (due to its fragile shell), the species is considered to have a high recoverability due to a high fecundity and larval dispersal rate (Ref 1-66; Ref 1-67). Furthermore, a regularly disturbed sedimentary habitat with a low diversity benthic assemblage is likely to recover more quickly (i.e., return to its disturbed or 'environmentally-stressed' baseline condition) than a stable habitat with a pre-existing mature and diverse assemblage (Ref 1-68).

4.4.4. In general, where studies have been undertaken to understand the effects of physical disturbance, they have shown recolonisation of deposited sediments by benthic species to be quite rapid. Sites are initially colonised by short lived, fast growing, opportunistic species ('r-selected') that are tolerant of high levels of disturbance; infaunal species dominate, particularly polychaetes worms. In time, these are succeeded by longer lived, slower growing species with a lower tolerance for disturbance (Ref 1-69; Ref 1-70). Rates of recovery reported in reviewed literature suggest that a recovery time of six to 24 months is characteristic of many mobile sands and estuarine muds where frequent disturbance of the deposits precludes the establishment of long-lived communities (Ref 1-71; Ref 1-72). In contrast, a community of sands and gravels may take two to three years to establish, depending on the proportion of sand and level of environmental disturbance by waves and currents (Ref 1-69; Ref 1-73).

*Summary of effects*

4.4.5. The capital dredge will remove approximately 4,000m³ of material over a maximum area of approximately 10,000m². It is expected that the material will be removed with a backhoe dredger.

4.4.6. Following the capital dredge, the dredge pocket will provide a similar habitat to that occurring under pre-dredge conditions. The baseline benthic surveys predominantly recorded surface sediment within and near to the dredge footprints with a high silt content (i.e., mud and sandy mud) (**Section 1.3 of Appendix A)**. Sub surface sampling in the capital dredge footprint recorded sediments from most sampling locations dominated by silt material (**Chapter 17: Marine Water and Sediment Quality [APP-059]** of the ES). This would provide a suitable substate for infaunal colonisation that is broadly comparable to existing sediment character which would then be expected to be recolonised by a similar assemblage to baseline conditions[16].

4.4.7. The speed of recolonisation is expected to occur over a short period of time based on an understanding of the benthic community present in the area and the life history strategies of the species. The project-specific subtidal survey (**Section 1.3 of Appendix A**) recorded an impoverished benthic community which is likely to reflect the existing high levels of physical disturbance in the area due to strong tidal currents and sediment movement.

4.4.8. Samples were characterised by polychaetes (such *Nephtys* spp, *Streblospio shrubsolii* and *Scoloplos armiger*), nematodes, oligochaetes *Tubificoides* spp and crustacean *Diastylis rathkei.* These species are typically fast growing and/or have rapid reproductive rates which allow populations to fully re-establish in typically less than 1-2 years and for some species within a few months (Ref 1-35; Ref 1-36; Ref 1-37). The benthic communities would, therefore, be expected to recolonise the dredge footprint relatively quickly. All the species recorded are commonly occurring and not protected. In addition, the faunal assemblage recorded is considered characteristic of subtidal habitats found more widely in this section of the Humber Estuary (Ref 1-57; Ref 1-58; Ref 1-59).

*Mitigation*

4.4.9. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.4.10. Following the capital dredge, the dredge pocket will provide a similar habitat to that occurring under pre-dredge conditions. In addition, following dredging, the subtidal habitat would be expected to be recolonised rapidly by a broadly similar invertebrate assemblage to baseline conditions. (see above and **Table 11**). The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

16 The majority of marine infauna is known to occur in the upper few centimetres of sediment (Ref 1-74;; Ref 1-75).

**Table 11: The potential for an AEOI due to changes to qualifying habitats as result of the removal of seabed material during capital dredging**

| Site | Features | Potential AEOI | Justification |
| --- | --- | --- | --- |
| Humber Estuary SAC | H1130: Estuaries | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | The capital dredge will not cause a change in habitat type (i.e., it will remain subtidal habitat with a similar substrate type) and therefore '*the extent and distribution of qualifying natural habitats'* conservation objective will not change. Following dredging, the subtidal habitat would be expected to be recolonised rapidly by a broadly similar invertebrate assemblage to baseline conditions. On this basis, the '*structure and function (including typical species) of qualifying natural habitats*' conservation objective would be expected not to change. Any '*Supporting processes on which qualifying natural habitats and habitats of qualifying species rely'* are also not expected to change as a direct result of sediment removal. |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | With respect to subtidal habitats, the capital dredge will not cause a change in habitat type (i.e., it will remain subtidal habitat with a similar substrate type) and therefore '*the extent and distribution of qualifying natural habitats'* conservation objective will not change. Following dredging, the subtidal habitat would be expected to be recolonised rapidly by a broadly similar invertebrate assemblage to baseline conditions. On this basis, the '*structure and function (including typical species) of qualifying natural habitats*' conservation objective would be expected not to change. Any '*Supporting processes on which qualifying natural habitats and habitats of qualifying species rely'* are also not expected to change as a direct result of sediment removal. |

**The potential effects of changes to qualifying habitats as a result of sediment deposition during capital dredging**

*General scientific context*

4.4.11. Sediments suspended and dispersed during the marine works, dredging and disposal have the potential to resettle over the seabed. This potential blanketing or smothering of benthic species may cause stress, reduced rates of growth or reproduction and in the worst cases the effects may be fatal (Ref 1-76; Ref 1-77).

4.4.12. Habitats within estuarine and coastal environments have highly fluctuating conditions including the resuspension and deposition of sediments on a daily basis (through tidal action), lunar cycles (due to the differing influences of spring and neap tides) and on a seasonal basis (due to storm activity and conditions of extreme waves). Subtidal and intertidal habitats are, therefore, characterised by such perturbations and the biological communities of these environments are well adapted to survival under fluctuating conditions.

4.4.13. If the amount of sediment deposited is too great to allow species to survive burial, then recovery occurs via re-colonisation and/or migration to the new sediment surface (Ref 1-78; Ref 1-79). In general, the rate of recovery is dependent upon how stable and diverse the assemblage was in the first place. A regularly disturbed sedimentary habitat with a low diversity benthic assemblage is likely to recover more quickly (i.e., return to its disturbed or 'environmentally-stressed' baseline condition) than a stable habitat with a pre-existing mature and diverse assemblage. A study by Bolam *et al.* (Ref 1-80), for instance, concluded that the relatively rapid recovery observed at a location on the Crouch Estuary was due to the opportunistic nature of the invertebrate assemblages and the dispersive behaviour of the dominant species that were present before the material was deposited. Furthermore, in cases where the quantity and type of sediment deposited does not differ greatly from natural sedimentation, e.g., of similar particle size, the effects are likely to be small as many of the species are capable of migrating up through the deposited sediments (Ref 1-81).

4.4.14. The MarESA approach (Ref 1-82) found that benthic communities in both sandy and muddy estuarine sediments are typically considered to be tolerant to the deposition of up to 5cm of fine material in a single event with burrowing species considered able to relocate to preferred depths through this level of deposition. Deposition of greater depths of fine sediment could result in some mortality although evidence suggests that some characterising species are likely to be able to reposition. Bivalve and polychaete species have been reported to migrate through depositions of sediment greater than 30 cm (Ref 1-67; Ref 1-72; Ref 1-37; Ref 1-36). A previous review by the University of Hull also concluded that benthic invertebrates in sediments are able to adapt and readjust if sediment laid is placed as thin veneers over several days although they can also tolerate moderate amounts (20 cm) of material being deposited at one time (Ref 1-83).

*Summary of effects*

4.4.15. Sediment changes that are predicted to occur as a result of the capital dredge are presented in **Chapter 16: Physical Processes [APP-058]**. In summary, maximum siltation as a result of the capital dredge within about 500m up and down the estuary from the edge of the dredge pocket is predicted to be around 1mm. Beyond this area, deposition levels are predicted to be negligible. Furthermore, once on the bed, the deposited material will return to the background system i.e. it will be put back into suspension on subsequent peak flood or ebb tides to be further dispersed.

4.4.16. The project-specific subtidal survey (**Section 1.3 of Appendix A**) recorded highly impoverished assemblage characterised polychaetes (such *Nephtys* spp, *Streblospio shrubsolii* and *Scoloplos armiger*), nematodes, oligochaetes *Tubificoides* spp and crustacean *Diastylis rathkei*. All the species recorded were considered commonly occurring and not protected.

4.4.17. The benthic species occurring within and near to the dredge area typically consist of burrowing infauna (such as polychaetes, oligochaetes or bivalves), which are considered tolerant to some sediment deposition. Based on evidence provided in relevant MarESA assessments, the characterising species recorded in the project-specific subtidal survey (described above) above are considered tolerant to deposition of at least 50mm with many species considered capable of burrowing through much greater levels of sediment deposition. The predicted millimetric changes in deposition are, therefore, considered unlikely to cause smothering effects as described above. In addition, the species recorded in the benthic invertebrate surveys are fast growing and/or have rapid reproductive rates which allow populations to fully re-establish in typically less than 1 to 2 years and for some species within a few months (Ref 1-59; Ref 1-191; Ref 1-15).

4.4.18. Deposition of sediment as a result of capital dredging will be highly localised and similar to background variability. Based on the evidence provided above the subtidal habitats within the vicinity of the proposed works are considered to have low sensitivity to smothering. The subtidal benthic communities present are also well adapted to survival under fluctuating sediment conditions and have high recoverability rates.

*Mitigation*

4.4.19. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.4.20. Deposition of sediment as a result of capital dredging will be highly localised and similar to background variability. This combined with the low sensitivity of species in the locality to such change (see above and **Table 12**), means the predicted effects are not considered to compromise any of the conservation objectives. It is therefore concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 12: The potential for an AEOI due to changes to qualifying habitats as a result of sediment deposition during capital dredging**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1130: Estuaries | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on the information provided above, sediment deposition during capital dredging will be highly localised and similar to background variability away from the direct vicinity of the dredge. Benthic species in the area are considered commonly occurring and also well adapted to survival under fluctuating sediment conditions. These species are also considered to have high recoverability rates. On this basis sediment deposition is not expected to cause a change to the '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species'* conservation objective. Deposition will also, therefore, not cause any changes to the '*the structure and function of qualifying natural habitats*' or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | H1140: Mudflats and sandflats not covered by seawater at low tide | | |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |

**The potential effects of changes to qualifying habitats as a result of sediment deposition during capital dredge disposal**

*General scientific context*

4.4.21. Scientific evidence on this impact pathway is provided in Paragraphs 4.4.11 to 4.4.14.

*Summary of effects*

4.4.22. The requirement for disposal of dredged material at sea associated with the Project would be fulfilled at licensed disposal sites HU056 and HU060 (see **Chapter 2: The Project [REP3-022]**).

4.4.23. The assessment of the sediment changes that are predicted to occur as a result of the capital dredging disposal is presented in **Chapter 16: Physical Processes [APP-058]**. In summary, sedimentation resulting from the disposal plume is predicted to be generally in the range of 1 to 2mm at distances of up to around 1km from the disposal sites. Further up and down estuary, maximum sedimentation as a result of the disposal activities is generally predicted to be negligible.

4.4.24. The disposal sites are located in the mid channel and are subject to regular natural physical disturbance (and associated scouring) as a result of very strong tidal flows. This is reflected in a generally impoverished assemblage at both disposal sites. In addition, millions of wet tonnes of dredge sediment are disposed of at HU060 annually which will also cause some disturbance due to sediment deposition.

4.4.25. The benthic species recorded within and adjacent to the disposal sites include mobile infauna (such as errant polychaetes e.g., *Arenicola* spp. and amphipods) which are able to burrow through sediment. They are, therefore, considered tolerant to some sediment deposition. In addition, characterising species typically have opportunistic life history strategies, with short life histories (typically two years or less), rapid maturation and the production of large numbers of small propagules which makes them capable of rapid recoverability should mortality as a result of smothering occur (Ref 1-34; Ref 1-35; Ref 1-36; Ref 1-37; Ref 1-38). On this basis, any effects are considered to be temporary and short term.

4.4.26. In summary, deposition in the wider area surrounding the disposal ground is expected to be in the order of millimetres. Sedimentation of this scale is unlikely to result in significant smothering effects to most faunal species with recoverability expected to be high.

*Mitigation*

4.4.27. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.4.28. Sedimentation of the scale predicted to arise from the disposal of dredge arisings is unlikely to result in significant smothering effects to most faunal species with recoverability expected to be high (see above and **Table 13**). The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 13: The potential for an AEOI due to changes to qualifying habitats as a result of sediment deposition during capital dredge disposal**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1110: Sandbanks which are slightly covered by sea water all the time | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on the information provided above, sediment deposition during dredge disposal will be highly localised and similar to background variability away from the direct vicinity of disposal. Benthic species in the area are considered commonly occurring and also well adapted to survival under fluctuating sediment conditions with have high recoverability rates. On this basis sediment deposition is not expected to cause a change to the '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species'* conservation objective. Deposition will also, therefore, not cause any changes to the '*the structure and function of qualifying natural habitats*' or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | H1130: Estuaries | | |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |

**The potential effects of changes to qualifying habitats as result of the removal of seabed material during maintenance dredging**

*General scientific context*

4.4.29. Scientific evidence on this impact pathway is provided in Paragraphs 4.4.2 to 4.4.4.

*Summary of effects*

4.4.30. Maintenance dredging causes the direct physical removal of marine sediments from the dredge footprint, resulting in the modification of existing marine habitats. The impacts to benthic fauna associated with the dredged material include changes to abundance and distribution through damage, mortality or relocation to a disposal site.

4.4.31. As summarised in the physical processes assessment (**Chapter 16: Physical Processes [APP-058]**), maintenance dredging is expected to be to be very limited (if required at all). As a result, any dredging that is required will only be undertaken infrequently (frequency will be dictated by operational requirements but it is anticipated there could be several years or more between maintenance dredge campaigns).

4.4.32. Maintenance dredging will create similar seabed sedimentary conditions to that occurring following capital dredging[17] with the surface layer of the seabed in the dredge footprint expected to be broadly comparable to the existing sediment character (i.e. sediment with a high silt content) following maintenance dredging.

4.4.33. On this basis, given the expected frequency of maintenance dredging, a comparable macrofaunal community to pre dredge conditions would be expected to occur over much of the maintenance dredging area between maintenance dredging campaigns[18]. Furthermore, the highly impoverished benthic community recorded in the project-specific subtidal survey **(Section 1.3 of Appendix A)** (which is likely to reflect the existing high levels of physical disturbance in the area due to strong near bed tidal currents and sediment transport) is considered characteristic of subtidal habitats found more widely in this section of the Humber Estuary (Ref 1-57; Ref 1-58; Ref 1-59). All of the species recorded are considered commonly occurring and not protected.

[17] The baseline benthic surveys predominantly recorded surface sediment within and near to the dredge footprints with a high silt content (i.e., mud and sandy mud) (Section 1.3 of Appendix A). Sub surface sampling in the capital dredge footprint recorded sediments from most sampling locations dominated by silt material (**Appendix 2a: The Waste Hierarchy Assessment [APP-172]**).

[18] The project-specific subtidal survey (Section 1.3 of Appendix A) recorded a benthic community characterised by polychaetes (such *Nephtys* spp, *Streblospio shrubsolii* and *Scoloplos armiger*), nematodes, oligochaetes *Tubificoides* spp and crustacean *Diastylis rathkei.* These species are typically fast growing and/or have rapid reproductive rates which allow populations to fully re-establish in typically less than 1-2 years and for some species within a few months (Ref 1-37, Ref 1-35, Ref 1-36)

*Mitigation*

4.4.34. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.4.35. Maintenance dredging (if required) will not cause a change in habitat type and as such a comparable macrofaunal community to pre dredge conditions would be expected to occur over much of the area between maintenance dredging campaigns. Furthermore, the seabed in this area is generally considered to be highly impoverished and of limited ecological value (see above and **Table 14**). The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 14: The potential for an AEOI due to changes to qualifying habitats as a result of as result of the removal of seabed material during maintenance dredging**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1130: Estuaries | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | The maintenance dredge will not cause a change in habitat type (i.e., it will remain subtidal habitat with a similar substrate type) and therefore '*the extent and distribution of qualifying natural habitats*' conservation objective will not change. Maintenance dredging is expected to be to be very limited (if required at all). As a result, any dredging that is required will only be undertaken infrequently and a comparable macrofaunal community to pre dredge conditions would be expected to occur over much of the maintenance dredging area between maintenance dredging campaigns. Furthermore, the seabed in this area is generally considered to be highly impoverished and of limited ecological value and the scale of the maintenance dredging as a result of the Project will not affect the overall functioning of subtidal habitats in the region. On this basis, any change to the '*structure and function (including typical species) of qualifying natural habitats'* conservation objective would be expected to be negligible. Any '*Supporting processes on which qualifying natural habitats and habitats of qualifying species rely'* is not expected to change as a direct result of sediment removal. |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |

## 4.5. Physical Loss or Damage Of Habitat Through Alterations in Physical Processes

**Indirect loss or change to qualifying habitats and species as a result of changes to hydrodynamic and sedimentary processes as a result of the marine works**

*General scientific context*

4.5.1. Port or harbour structures (such as piles, breakwaters, coastal defences, jetties or quay walls) can cause changes to hydrodynamics (flow speeds, flow direction, waves, water levels) and seabed morphology (Ref 1-84; Ref 1-85; Ref 1-86). Such changes have the potential to affect habitat quality and result in changes to the diversity, abundance and biomass of intertidal and subtidal species.

4.5.2. Dredging can cause direct habitat changes resulting from seabed removal and sediment deposition, as well as indirect habitat changes linked to hydrodynamic and sedimentary processes. Deepening or widening of channels during dredging can change seabed bathymetry and potentially alter flow patterns (speed/direction), wave exposure and cause tidal amplification (Ref 1-87; Ref 1-88; Ref 1-89).

4.5.3. These hydrodynamic changes can lead to changes in sediment transport and also patterns of emersion/immersion as well as erosion/accretion of marine sedimentary habitats such as mudflats and sandbanks (Ref 1-87). For example, Ref 1-89) found that saltmarsh retreat was related to an increase in the tidal prism brought about by dredging operations to maintain or increase the depth of the main navigable channel of the Westerschelde Estuary in the Netherlands. The consequent greater frequency with which the high tides reached the edge of the fringing marshes increased the risk of erosion.

4.5.4. Increased flow rates can also increase scouring and bed disturbance of subtidal and intertidal habitats which can cause a reduction in diversity and an increase in more opportunistic species. In addition, reductions in water flow could increase siltation levels which could change the habitat type of a seabed and lead to sedimentation (Ref 1-34). Marine invertebrates inhabiting sand and mud habitat show different tolerance ranges of physiological stresses caused by exposure and tidal elevation. This can lead to ‘zonation’ (Ref 1-90). Bathymetric changes caused by dredging could, therefore, change the vertical distribution of marine habitats if post-dredging water depths were outside the range at which specific biotopes exist.

*Summary of effects*

4.5.5. An assessment of the hydrodynamic and sediment regime changes that are predicted to occur as a result of the marine works are presented in **Chapter 16: Physical Processes [APP-058]**. It should be noted that predicted changes are primarily as a result of the presence of the jetty with the effects due to the capital dredge having a negligible, localised effect.

4.5.6. Slight increases to local peak ebb current speed landward of the berth pocket are predicted to cause a limited amount of erosion of the bed along part of the lower intertidal (at the elevation of Mean Low Water Springs ("MLWS")) beneath the landward ends of the proposed jetty. This will result in a potential indirect loss in the intertidal area (up to approximately 0.04 ha). The assessment indicates that once the softer upper layer is removed, the harder, more consolidated, underlayer of bed material is unlikely to erode further. This calculation represents a worst-case assessment of potential elevation changes and has been considered on a precautionary basis. The level of predicted change is at the limit of the accuracy of the modelled data and, in real terms, is likely to be immeasurable against the context of natural variability (as a result of storm events, for example).

4.5.7. This intertidal habitat loss represents approximately 0.00011% of the Humber Estuary SAC and approximately 0.00043% of the 'mudflats and sandflats not covered by seawater at low tide' feature of the Humber Estuary SAC[19].

4.5.8. This loss also represents 0.00011% of the Humber Estuary SPA/Ramsar[20]. When considering this in the context of intertidal area, the area of loss represents approximately 0.00045% of intertidal foreshore habitats[21] and approximately 0.00063% of mudflat[22] within the SPA.

4.5.9. The predicted intertidal loss, albeit assessed on a worst case basis, also consists of a very narrow strip on the lower shore around the sublittoral fringe. This predicted loss would be of a similar scale to that which can occur due to natural background changes in mudflat extent in the local region (e.g., due to seasonal patterns in accretion and erosion or following storm events). It is not considered that this *de minimis* change in mudflat extent will change the overall structure or functioning of the nearby mudflats within the Port of Immingham area or more widely in the Humber Estuary.

4.5.10. Away from the very thin strip of predicted loss, ecological functioning of the mudflat will continue with natural processes associated with maintaining mudflat community composition such as larval dispersal and colonisation not affected. In addition, any changes associated with other ecological parameters important in maintaining mudflat such as sediment type, elevation and sediment deposition will be negligible as a direct result of the predicted loss. As a result, no wider changes in the abundance and diversity of infaunal communities are expected on mudflat in the local area. In summary, the indirect loss of intertidal habitat is de minimis in extent and considered ecologically inconsequential given the negligible contribution that a loss of this type and magnitude has for the overall structure and functioning of the wider intertidal habitat feature.

[19] Based on the extents given in the Standard Data Form on the JNCC website (**Ref 1-45**).
[20] Based on the extents given in the Standard Data Form on the JNCC website (**Ref 1-46**).
[21] Based on using the 'Intertidal Substrate Foreshore (England and Scotland)' data layer (https://magic.defra.gov.uk/Metadata_for_MAGIC/SPIRE%20intertidal%20substrate%20foreshore.pdf. (Ref 1-11).
[22] Based on using mudflat data layer of the Priority Habitat Inventory (England) (https://data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england). (**Ref 1-50**).

4.5.11. The predicted intertidal loss is also considered to have limited functional value to waterbirds which utilise the foreshore in this location (such as Black-tailed Godwit, Turnstone, Curlew, Dunlin, Oystercatcher, Redshank and Shelduck) (**Table A8 of Appendix A**). This is because while these species could, therefore, potentially be feeding in the predicted areas of habitat loss during low water periods, these very small areas remain largely inundated with water and are only uncovered for a very short duration.

4.5.12. To put this into context, consideration has been given to the proportion of time that the areas of loss are available to feed over the course of a year. Based on tide gauge data at Immingham in 2020, the area of indirect loss was completely submerged for 99% of the time. The area of indirect loss, therefore, currently provides almost no feeding opportunities for coastal waterbirds. Furthermore, the spatial extent of loss represents a barely measurable and inconsequential reduction in available habitat for these mobile species even at a local scale.

4.5.13. On this basis, it can be concluded that any change to prey resources for birds feeding in the local area will be negligible and individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) will not be affected.

*Mitigation*

4.5.14. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.5.15. Effects on the hydrodynamic and sedimentary processes as a result of the Project are predicted to be small scale and highly localised. The predicted intertidal loss is also considered to be negligible in the context of the amount of similar habitat in the region and have limited functional value to waterbirds which utilise the foreshore in this location (see above and **Table 15).** The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 15: The potential for an AEOI due to indirect changes to qualifying habitats (and supporting habitats) and qualifying species as a result of changes to hydrodynamic and sedimentary processes as a result of the marine works**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1130: Estuaries | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Magnitude of change on marine habitats and species from these highly localised and small scale predicted effects on the hydrodynamic and sedimentary processes is considered to be negligible in the context of natural background change. On this basis the potential effects are not expected to cause a change to '*the extent and distribution of qualifying natural habitats and* habitats of the qualifying species' conservation objective. The potential effects will also, therefore, not cause any changes to the '*the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | H1140: Mudflats and sandflats not covered by seawater at low tide | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Magnitude of change on marine habitats and species from these highly localised and small scale predicted effects on the hydrodynamic and sedimentary processes is considered to be negligible including predicted erosion on nearby intertidal habitats in the context of natural background change. On this basis changes to hydrodynamic and sedimentary processes are not |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | expected to cause a change to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species'* conservation objective. The potential effects will also not cause any changes to '*the structure and function of qualifying natural habitats*' or cause modifications to '*the supporting processes on which qualifying natural habitats rely*' conservation objectives. |
| Humber Estuary SPA | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | The potential effects have been considered in the context of the site's conservation objectives.<br>The predicted intertidal habitat loss will not cause changes to '*the populations of each of the qualifying features'* conservation objective. This is because the scale of loss is not considered to be of a magnitude that would cause changes to the diet or prey consumption of species so that individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) are affected.<br>The '*distribution of the qualifying features within the site'* conservation objective will not be affected as the predicted loss is *de minimis* in extent |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | and of a scale that would not cause changes in local distribution.<br>The footprint of predicted habitat loss under baseline (pre-construction) conditions already provides very limited feeding opportunities due to the low elevation on the shore and *de minimis* extent. This loss is considered negligible in the context of available feeding habitat even at a local scale along the eastern frontage of the port. The effects of the habitat loss will also be highly limited in terms of the overall wider functionality of the local mudflats for feeding birds. On this basis, any change to the '*structure and function of the habitats of the qualifying features*' conservation objective is considered inconsequential.<br>The loss in intertidal habitat is considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SPA/Ramsar). On this basis any change to the '*extent and distribution of the habitats of the qualifying features*' conservation objectives is considered inconsequential. |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on the information provided above, magnitude of change on marine habitats and species from these highly localised and small scale predicted effects on the hydrodynamic and sedimentary processes is considered to be negligible including predicted erosion on nearby intertidal habitats. On this basis changes to hydrodynamic and sedimentary processes are not expected to cause a change to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species'* conservation objective. The potential effects will also not cause any changes to the '*the structure and function of qualifying natural habitats*' or cause modifications to '*the supporting processes on which qualifying natural habitats rely*' conservation objectives. |
| | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | | The potential effects have been considered in the context of the site's conservation objectives.<br>The predicted intertidal habitat loss will not cause changes to '*the populations of each of the qualifying features'* |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br><br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | conservation objective. This is because the scale of loss is not considered to be of a magnitude that would cause changes to the diet or prey consumption of species so that individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) are affected.<br><br>The '*distribution of the qualifying features within the site'* conservation objective will not be affected as the predicted loss is *de minimis* in extent and of a scale that would not cause changes in local distribution.<br><br>The footprint of predicted habitat loss under baseline conditions already provides very limited feeding opportunities due to the low elevation on the shore and *de minimis* extent. This loss is considered negligible in the context of available feeding habitat even at a local scale along the eastern frontage of the port. The effects of the habitat loss will also be highly limited in terms of the overall wider functionality of the local mudflats for feeding birds. On this basis, any change to the '*structure and function of the habitats of* |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | *the qualifying features'* conservation objective is considered inconsequential.<br>The loss in intertidal habitat is considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SPA/Ramsar). On this basis any change to the '*extent and distribution of the habitats of the qualifying features'* conservation objectives is considered inconsequential. |

**Indirect changes to qualifying habitats as a result of changes to hydrodynamic and sedimentary processes during capital dredge disposal**

*General scientific context*

4.5.16. Scientific evidence on this impact pathway is provided in Paragraphs 4.5.1 to 4.5.4.

*Summary of effects*

4.5.17. An assessment of the hydrodynamic and sediment regime changes that are predicted to occur as a result of the capital dredging disposal is presented in **Chapter 16: Physical Processes [APP-058]**.

4.5.18. Local changes to the bathymetry (as a result of material disposal to the bed) within the disposal site will be small in the context of the existing depths. Disposal activity will be targeted to the deeper areas within the site, ensuring that bed level changes are not excessive in any one area, thus, minimising the overall change. As a result, associated changes to the local hydrodynamics (and sediment transport pathways) will be negligible.

4.5.19. These changes are not likely to result in any significant changes to local sediment transport in the region although some localised changes to seabed bathymetry and morphology could occur.

4.5.20. In addition, the predicted changes in flow rates and subtidal seabed morphology are not expected to modify existing subtidal habitat types found in the area (i.e., mobile sand habitats characterised by an impoverished infaunal assemblage).

4.5.21. The indirect loss and changes to subtidal habitats due to changes in hydrodynamic and sedimentary processes as a result of the capital dredge disposal are highly localised and small scale. The subtidal habitats which will be potentially affected are of low ecological value and are considered to be tolerant of the level of change in conditions expected and on this basis the effect is considered to be negligible.

*Mitigation*

4.5.22. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.5.23. The magnitude of change on marine habitats and species from the highly localised and small scale predicted effects on the hydrodynamic and sedimentary processes arising from the capital dredge disposal are considered to be negligible (see above and **Table 16**). The predicted effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 16: The potential for an AEOI due to indirect changes to qualifying habitats as a result of changes to hydrodynamic and sedimentary processes during capital dredge disposal**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1110: Sandbanks which are slightly covered by sea water all the time | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Magnitude of change on marine habitats and species from these highly localised and small scale predicted effects on the hydrodynamic and sedimentary processes is considered to be negligible. Negligible changes in erosion and accretion are predicted to occur on nearby intertidal habitats. On this basis the potential effects are not expected to cause a change to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species'* conservation objective. The potential effects will also not cause any changes to '*the structure and function of qualifying natural habitats*' or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | H1130: Estuaries | | |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |

## 4.6. Direct Changes to Qualifying Habitats Beneath Marine Infrastructure Due to Shading

**Direct changes to qualifying habitats beneath marine infrastructure due to shading**

*General scientific context*

4.6.1. Artificial shading such as due to pontoons or jetty/pier decking has the potential to cause localised changes to the structure and functioning of biological communities in natural ecosystems (Ref 1-91; Ref 1-92; Ref 1-93).

4.6.2. In sedimentary habitats microphytobenthos, macrofauna, sediment erodibility and biogeochemical sediment properties are often found to differ significantly between shaded and unshaded sediments (Ref 1-94; Ref 1-95; Ref 1-93). Microphytobenthos are significant drivers of ecosystem functioning in benthic habitats influencing biogeochemical properties of sediment, food web dynamics (Ref 1-96) and sediment erodibility (Ref 1-97)). Heavy shading alters microphytobenthos assemblages causing a variety of responses, including changes in biomass, pigment ratios, species richness and diversity (Ref 1-94; Ref 1-93). These changes can therefore have cascading effects on the sediments they inhabit and associated faunal assemblages (Ref 1-95; Ref 1-91; Ref 1-93). For example, Tolhurst *et al*. (Ref 1-93) found heavy shading of an intertidal mudflat caused directional responses in sediment properties, in line with a decrease in microphytobenthos, including reductions in chlorophyll *a*, colloidal carbohydrate, erosion threshold and total carbohydrate; and increased erosion rate and water retention. This resulted in significant changes in the faunal assemblage, driven by large decreases in oligochaetes and sabellid polychaetes – likely to be a direct response to the reduction of food; either the amount of microphytobenthos, or perhaps bacteria, or meiofauna (Ref 1-93).

4.6.3. Shading of hard substrates, such as rocky shores and seawalls, can often alleviate stressful conditions associated with temperature and desiccation, caused by emersion during low tide (Ref 1-98). However, this can also cause shifts in the structure and diversity of biological communities, by reducing macroalgae cover (Ref 1-99; Ref 1-98), increasing the abundance of filter feeding invertebrates and mobile consumers (Ref 1-100; Ref 1-98), altering sessile assemblages (Ref 1-101) and influencing larval recruitment (Ref 1-99; Ref 1-102). For example, Pardal-Souza *et al*. (Ref 1-102) found shading to consistently affect the biological community of rocky shores, such that the biomass and cover of macroalgae, and the size of most sedentary grazers, were smaller. Additionally, in the infralittoral fringe there was a shift in dominance from macroalgae to invertebrate filter feeders (Ref 1-102). Larval recruitment was also affected, with oysters and barnacles recruiting more in shaded habitats (Ref 1-102).

*Summary of effects*

4.6.4. Changes in sunlight levels as a result of shading have the potential to cause changes to the benthic communities leading to a change in habitat quality. In particular, shading can reduce the amount of light available for species that perform photosynthesis such as macroalgae species (seaweeds), macrophytes (such as saltmarsh plants) and microphytobenthos.

4.6.5. The open piled approach jetty could cause some shading to intertidal mudflat habitat. Given that these structures will be located several metres above the seabed, however, some natural light would be expected to reach the mudflat from either side of these structures at all times of the day with no habitat permanently shaded. Shading at the level predicted would only be expected to cause negligible changes to the growth rates of macroalgae species (seaweeds) and microphytobenthos occurring on the foreshore. Furthermore, no saltmarsh and only limited macroalgae occurs on mudflats in this area.

4.6.6. The subtidal and intertidal habitats and associated benthic communities are commonly occurring in the region and the effect of shading will be highly localised.

*Mitigation*

4.6.7. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.6.8. As outlined above and in **Table 17**, subtidal and intertidal habitats and associated benthic communities are commonly occurring in the region and the effect of shading will be highly localised and effects negligible. The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 17: The potential for an AEOI due to direct changes to qualifying habitats beneath marine infrastructure due to shading**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on the information provided above, potential shading effects are considered to be negligible. On this basis the potential effects are not expected to cause a change to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Shading on this scale will also not cause any changes to the *'the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |

## 4.7. Physical Change to Habitats Resulting from the Deposition of Airborne Pollutants

**Physical change to qualifying habitats resulting from the deposition of Nitrogen, NH3 and NOx from marine vessel and landside plant emissions during operation.**

*General scientific context*

4.7.1. Exhaust emissions from marine vessels and landside plant during the operational phase have the potential to impact on local air quality, with the emission of $NO_X$ (mainly in the form of nitric oxide ("NO"), which is then converted to $NO_2$ in the atmosphere) and ammonia NH3 being the main pollutants of concern in relation to coastal saltmarsh.

4.7.2. Coastal saltmarsh is sensitive to effects from nitrogen deposition as vegetation is nitrogen limited (Ref 1-103) and is therefore potentially vulnerable to eutrophication. Effects may be observed as increased graminoid (grasses) biomass, with potentially adverse effects on forbs (Ref 1-104).

4.7.3. The Air Pollution Information System ("APIS") defines site-specific Critical Loads relevant to each European site for nitrogen deposition. The relevant nitrogen Critical Loads (which have recently been updated on the APIS website) are 10 - 20 kg N/ ha/ yr for 'low-mid and mid-upper saltmarshes' (H1330) and 20 – 30 kg N/ ha/ yr for 'pioneer saltmarshes' (H1310).

4.7.4. Environment Agency guidance (Ref 1-105) states that impacts may be considered insignificant ('not significant') where:

a. The short-term impact is less than 10% of environmental assessment level for the nature conservation site.

b. The long-term impact is less than 1% of the long-term air quality objective or environmental assessment level for the nature conservation site.

4.7.5. Where the long-term impact at a nature conservation receptor exceeds these criteria, it may also be considered insignificant ('not significant') where:

4.7.6. The long-term total concentration after the impact lies below the air quality objective or environmental assessment level for the nature conservation site.

4.7.7. The assessment of operational effects on air quality has been carried out in line with the IAQM 'Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites' (Ref 1-106) and the methodology is detailed in **Chapter 6: Air Quality [APP-048]**. It has also been undertaken with reference to a step-by-step approach to assessment as set out in the guidance document NEA001[23]. The assessment begins by considering whether the contribution of the project exceeds 1% of the critical load or level, then whether the contribution 'in combination' exceeds 1% of the critical load or level. If it does exceed 1% either alone or in combination with other projects or plans then further ecological

[23] Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations - NEA001

interpretation has been undertaken. The assessment considered both onsite and offsite sources, however only the onsite operational emissions are relevant to coastal saltmarsh. The modelled emissions sources included marine vessel, land-tug and road traffic emissions. The modelling has taken into account The International Convention for the Prevention of Pollution from Ships (MARPOL) standards for marine vessel NOx emissions.

4.7.8. An in-combination air quality assessment for the Project with the adjacent IERRT project (now passed through the DCO Examination phase) has also been undertaken, as given the proximity of the two projects to each other (they are at adjacent locations within the port of Immingham), there are clearly potential pathways by which operational marine vessel, road traffic and landside plant emissions from both projects could affect designated habitats in the same/similar locations. The air quality modelling has also taken into account any other relevant projects that could result in in-combination effects with the Project. This is considered in the in-combination effects section of the Shadow HRA (**Section 4.15**). No assessment in combination with the Viking CCS pipeline project was undertaken since no construction vehicles associated with that project will travel within 200m of any European site and there are no operational emissions.

*Summary of effects*

4.7.9. Emissions from docked marine vessels and landside plant during operation of the Project alone have been modelled in **Chapter 6: Air Quality [APP-048]**. The potential for NOx, $NH_3$, $SO_2$ and N deposition to affect designated habitats that are sensitive to these emissions within the Humber Estuary EMS has been identified. The maximum forecast number of vessel calls during operation is 292 each year (average of 0.8 vessels per day); which is very small when considered in context with the baseline vessel movements within the Humber Estuary, which Department for Transport ("DfT") statistics indicate is one of the busiest waterways in the UK serving the main Humber Ports of Hull, Goole, Grimsby and Immingham. Analysis of marine traffic presented within **Chapter 12: Marine Transport and Navigation [APP-054]** states that average daily vessel movements in this section of the Estuary (in the one year period between September 2021 and August 2022) were 78 per day. The majority of the vessels were cargo vessels (c. 47% of movements) followed by tugs (24%), tankers (15%) and passenger vessels (5%).

4.7.10. The assessment of air quality impacts on nature conservation receptors has been informed by modelling presented in **Chapter 6: Air Quality [APP-048]** and the following sections of that chapter are relevant to the assessment:

a. Table 6.19 – presents the outcome of air quality modelling on sensitive habitat receptors in the Humber Estuary assuming that all vessels calling at the Project will conform to the MARPOL Tier III NOx emissions standard.

b. Table 6.20 - presents the outcome of air quality modelling on sensitive habitat receptors in the Humber Estuary assuming that all vessels calling at the Project will conform to the MARPOL Tier II NOx emissions standard.

c. Figure 6.3 showing the locations of the modelled receptor locations within the Humber Estuary designated site.

4.7.11. MARPOL Tier III is more stringent than MARPOL Tier II; in order to go from the NOx Tier II limits to the NOx Tier III limits, NOx emissions must be cut by about 75%. The assessment of operational effects on air quality has been carried out in line with the IAQM 'Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites' (Ref 1-106) and the methodology is detailed in **Chapter 6: Air Quality [APP-048]**. The assessment considered both onsite and offsite sources; however, only the onsite emissions are relevant to coastal saltmarsh. The emissions sources included vessel, land-tug and road traffic emissions.

4.7.12. While the '1% of the critical level/load' threshold is an important initial assessment threshold, it is not a damage threshold. Moreover, whether the critical level or load will be exceeded by total pollutant concentrations/deposition rates is also important. Modelling presented in **Table 6.19** in **Chapter 6: Air Quality [APP-048]**, which is reproduced as **Table 18** below, demonstrates that with vessels complying with MARPOL Tier III emissions standards, modelled IGET sources account for 1% or less of the Critical Level for annual mean NOx at all but two receptor locations (O_E1 and O_E2). At these two locations, total NOx concentrations account for approximately 52% of the Critical Level (i.e. the critical level would not be exceeded). With MARPOL Tier III emissions standards, modelled IGET sources also account for 1% or less of the Critical Levels for $SO_2$ and $NH_3$ and of the Critical Load for nitrogen deposition, noting that the IAQM state that the 1% screening criteria should not be used rigidly and not to a numerical precision greater than the expression of the criteria themselves[24].

4.7.13. Modelling presented in **Table 6.20** in **Chapter 6: Air Quality [APP-048]**, which is reproduced as **Table 19** below, demonstrates that with vessels complying with MARPOL Tier II emissions standards (i.e. the less stringent standard), modelled IGET sources account for 1% or less of the Critical Level for annual mean NOx at all but three receptor locations (O_E1, O_E2 and O_E3). At these three locations, total NOx concentrations account for approximately 56% of the Critical Level (i.e. the critical level would not be exceeded). With MARPOL Tier II emissions standards, modelled IGET sources account for 1% or less of the Critical Levels for $SO_2$ and $NH_3$, and the Critical Levels are not exceeded for either pollutant. IGET sources account for 1% or less of the Critical Load for nitrogen deposition at all but two receptors (O_E1 and O_E2), with an impact equivalent to 1.7% and 1.9% of the critical load respectively. At these locations, the Critical Load for nitrogen deposition is already exceeded by the background contribution alone with the IGET contribution accounting for just 1.2% of the total nitrogen deposition rate predicted at these locations. Therefore, the impact of the Project on nitrogen deposition under a MARPOL Tier II emissions scenario is greater than 1% of the critical load (being approximately 2% of the critical load) at two receptor locations, and therefore needs further consideration.

[24] ' Whilst it is straightforward to generate model results for the PC to any level of precision required, the accuracy of the result is much less certain and it is unwise to place too much emphasis on whether the PC is 0.9% or 1.1%' source: air-quality-impacts-on-nature-sites-2019.pdf (iaqm.co.uk)

4.7.14. At the worst affected nature conservation receptors (O_E1 and O_E2), which relate to saltmarsh habitat on the northern shore of the Estuary) (**Figure 6.3** in **Chapter 6: Air Quality [APP-048]**), the change in annual mean $NH_3$ and $SO_2$ can be screened as insignificant in line with Environment Agency guidance as the changes do not exceed 1% of the Critical Levels for $NH_3$ and $SO_2$. However, the annual mean NOx concentration and annual N deposition rate cannot be screened as insignificant as it exceeds the 1% screening threshold. The area of affected saltmarsh is shown on the isopleth **Plate 3**.

**Table 18: Operational concentrations and deposition rates at selected nature conservation sensitive receptors for 2028 (also representing 2036) – Assuming MARPOL Tier III Emissions Standards (with SCR)**

| Rec. ID | Annual Mean Background Contribution (µg/m³)[1] | | | | Annual Mean Modelled Baseline Contribution (µg/m³)[2] | | | | Annual Mean Modelled IGET Contribution (µg/m³)[3] | | | | Annual Mean Concentration/ Deposition Rate (µg/m³)[4] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep |
| | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr |
| O_E1 | 15.1 | 2.1 | 1.5 | **14.6** | 0.3 | <0.1 | <0.01 | 0.03 | 0.5 | <0.1 | 0.01 | 0.10 | 16.0 | 2.1 | 1.6 | 14.7 |
| O_E2 | 15.1 | 2.1 | 1.5 | **14.6** | 0.3 | <0.1 | <0.01 | 0.02 | 0.5 | <0.1 | 0.01 | 0.11 | 15.9 | 2.1 | 1.6 | 14.7 |
| O_E3 | 14.9 | 1.8 | 1.6 | **13.9** | 0.1 | <0.1 | <0.01 | 0.01 | 0.2 | <0.1 | <0.01 | 0.04 | 15.2 | 1.8 | 1.6 | **13.9** |
| O_E4 | 13.8 | 1.7 | 1.6 | **13.9** | 0.1 | <0.1 | <0.01 | 0.01 | 0.2 | <0.1 | <0.01 | 0.03 | 14.0 | 1.7 | 1.6 | **13.9** |
| O_E5 | 16.6 | 3.9 | 1.5 | **14.7** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.03 | 16.7 | 3.9 | 1.5 | **14.7** |
| O_E6 | 19.1 | 3.4 | 1.6 | **16.0** | 0.1 | <0.1 | <0.01 | 0.01 | 0.1 | <0.1 | <0.01 | 0.02 | 19.3 | 3.4 | 1.6 | **16.0** |
| O_E7 | 12.6 | 1.6 | 1.6 | **13.9** | 0.1 | <0.1 | <0.01 | 0.01 | 0.1 | <0.1 | <0.01 | 0.02 | 12.8 | 1.6 | 1.6 | **13.9** |
| O_E8 | 14.6 | 2.2 | 1.5 | **14.7** | <0.1 | <0.1 | <0.01 | <0.01 | <0.1 | <0.1 | <0.01 | 0.01 | 14.6 | 2.2 | 1.5 | **14.7** |
| O_E9 | 15.8 | 1.9 | 1.5 | **14.7** | <0.1 | <0.1 | <0.01 | <0.01 | <0.1 | <0.1 | <0.01 | 0.01 | 15.8 | 1.9 | 1.5 | **14.7** |
| O_E10 | 25.1 | 2.8 | 1.6 | **13.5** | <0.1 | <0.1 | <0.01 | <0.01 | <0.1 | <0.1 | <0.01 | 0.01 | 25.2 | 2.8 | 1.6 | **13.5** |
| O_E11 | 21.1 | 3.4 | 1.6 | **16.0** | <0.1 | <0.1 | <0.01 | <0.01 | <0.1 | <0.1 | <0.01 | 0.01 | 21.2 | 3.4 | 1.6 | **16.0** |
| O_E12 | **36.5** | 3.0 | 1.6 | **16.0** | <0.1 | <0.1 | <0.01 | <0.01 | <0.1 | <0.1 | <0.01 | 0.01 | **36.5** | 3.0 | 1.6 | **16.0** |

| Rec. ID | Annual Mean Background Contribution (µg/m³)[1] | | | | Annual Mean Modelled Baseline Contribution (µg/m³)[2] | | | | Annual Mean Modelled IGET Contribution (µg/m³)[3] | | | | Annual Mean Concentration/ Deposition Rate (µg/m³)[4] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep |
| | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr |
| O_E13 | 13.6 | 2.0 | 1.5 | **14.6** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.01 | 13.7 | 2.0 | 1.5 | **14.6** |
| O_E14 | 11.6 | 1.7 | 2.1 | **16.1** | <0.1 | <0.1 | <0.01 | <0.01 | <0.1 | <0.1 | <0.01 | 0.01 | 11.7 | 1.7 | 2.1 | **16.1** |
| O_E15 | 11.6 | 1.7 | 2.1 | **16.1** | <0.1 | <0.1 | <0.01 | <0.01 | <0.1 | <0.1 | <0.01 | 0.01 | 11.7 | 1.7 | 2.1 | **16.1** |

**Notes:**

[1] Background contribution of existing sources, minus the contribution from the sources specifically modelled.

[2] Model contribution, including the contribution from the IERRT project and other cumulative sources.

[3] Modelled contribution from IGET construction traffic emissions.

[4] Annual mean concentration is the combined contribution of background and modelled sources.

**Table 19: Operational concentrations and deposition rates at selected nature conservation sensitive receptors for 2028 (also representing 2036) – Assuming MARPOL Tier II Emissions Standard (without SCR)**

| Rec. ID | Annual Mean Background Contribution (µg/m³)[1] | | | | Annual Mean Modelled Baseline Contribution (µg/m³)[2] | | | | Annual Mean Modelled IGET Contribution (µg/m³)[3] | | | | Annual Mean Concentration/ Deposition Rate (µg/m³)[4] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $NO_x$ | $SO_2$ | $NH_3$ | N-dep | $NO_x$ | $SO_2$ | $NH_3$ | N-dep | $NO_x$ | $SO_2$ | $NH_3$ | N-dep | $NO_x$ | $SO_2$ | $NH_3$ | N-dep |
| | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr |
| O_E1 | 15.1 | 2.1 | 1.5 | **14.6** | 0.3 | <0.1 | <0.01 | 0.03 | 1.5 | <0.1 | 0.01 | 0.17 | 17.0 | 2.1 | 1.5 | **14.8** |
| O_E2 | 15.1 | 2.1 | 1.5 | **14.6** | 0.3 | <0.1 | <0.01 | 0.02 | 1.6 | <0.1 | 0.01 | 0.19 | 17.0 | 2.1 | 1.5 | **14.8** |
| O_E3 | 14.9 | 1.8 | 1.6 | **13.9** | 0.1 | <0.1 | <0.01 | 0.01 | 0.6 | <0.1 | <0.01 | 0.07 | 15.6 | 1.8 | 1.6 | **14.0** |
| O_E4 | 13.8 | 1.7 | 1.6 | **13.9** | 0.1 | <0.1 | <0.01 | 0.01 | 0.4 | <0.1 | <0.01 | 0.05 | 14.3 | 1.7 | 1.6 | **14.0** |
| O_E5 | 16.6 | 3.9 | 1.5 | **14.7** | <0.1 | <0.1 | <0.01 | <0.01 | 0.3 | <0.1 | <0.01 | 0.04 | 16.9 | 3.9 | 1.5 | **14.7** |
| O_E6 | 19.1 | 3.4 | 1.6 | **16.0** | 0.1 | <0.1 | <0.01 | 0.01 | 0.2 | <0.1 | <0.01 | 0.03 | 19.4 | 3.4 | 1.6 | **16.0** |
| O_E7 | 12.6 | 1.6 | 1.6 | **13.9** | 0.1 | <0.1 | <0.01 | 0.01 | 0.3 | <0.1 | <0.01 | 0.04 | 12.9 | 1.6 | 1.6 | **13.9** |
| O_E8 | 14.6 | 2.2 | 1.5 | **14.7** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.02 | 14.7 | 2.2 | 1.5 | **14.7** |
| O_E9 | 15.8 | 1.9 | 1.5 | **14.7** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.01 | 15.9 | 1.9 | 1.5 | **14.7** |
| O_E10 | 25.1 | 2.8 | 1.6 | **13.5** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.01 | 25.3 | 2.8 | 1.6 | **13.5** |
| O_E11 | 21.1 | 3.4 | 1.6 | **16.0** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.02 | 21.3 | 3.4 | 1.6 | **16.0** |
| O_E12 | **36.5** | 3.0 | 1.6 | **16.0** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.01 | **36.6** | 3.0 | 1.6 | **16.0** |

| Rec. ID | Annual Mean Background Contribution (µg/m³)[1] | | | | Annual Mean Modelled Baseline Contribution (µg/m³)[2] | | | | Annual Mean Modelled IGET Contribution (µg/m³)[3] | | | | Annual Mean Concentration/ Deposition Rate (µg/m³)[4] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep | $NO_X$ | $SO_2$ | $NH_3$ | N-dep |
| | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr | µg/m³ | | | kgN/ ha/yr |
| O_E13 | 13.6 | 2.0 | 1.5 | **14.6** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.02 | 13.8 | 2.0 | 1.5 | **14.6** |
| O_E14 | 11.6 | 1.7 | 2.1 | **16.1** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.01 | 11.7 | 1.7 | 2.1 | **16.1** |
| O_E15 | 11.6 | 1.7 | 2.1 | **16.1** | <0.1 | <0.1 | <0.01 | <0.01 | 0.1 | <0.1 | <0.01 | 0.01 | 11.7 | 1.7 | 2.1 | **16.1** |

**Notes:**

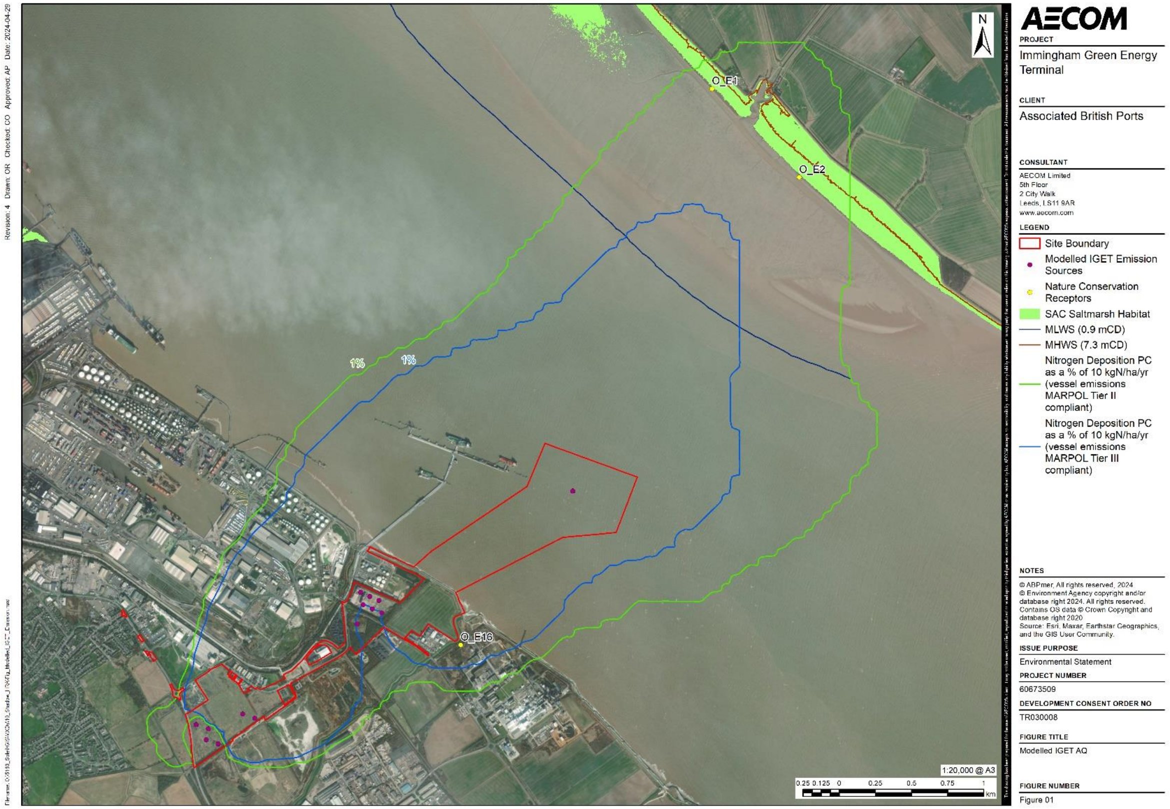
[1] Background contribution of existing sources, minus the contribution from the sources specifically modelled.

[2] Model contribution, including the contribution from the IERRT project and other cumulative sources.

[3] Modelled contribution from IGET construction traffic emissions.

[4] Annual mean concentration is the combined contribution of background and modelled sources.

**Plate 3: Isopelth Diagram (operational N deposition assuming a precautionary 10 kgN/ha/yr as the suitable critical load)**



4.7.15. In **Plate 3**, the lowest part of the critical load range, suitable for species-rich upper marsh (Atlantic salt meadow) has been used. However, for saltmarsh, APIS provides two Critical Load ranges, one of 10 - 20 kg/ha/yr suitable for upper saltmarsh (Atlantic salt meadows) and one of 20-30 kgN/ha/yr suitable for pioneer saltmarsh.

4.7.16. The change in threshold values for critical loads in APIS has been informed by recent studies in Ireland and the Netherlands, and a collaboration under the Working Group on Effects ("WGE") of the UNECE Convention on Long-Range Transboundary Air Pollution reported by the German Environment Agency (Ref 1)-. That research has shown that position of the saltmarsh in the tidal profile is relevant to which part of the critical load range is more appropriate. This is because the less the frequency or duration of inundation by seawater, the more important atmosphere becomes as a source of nitrogen. The APIS Site Relevant Critical Load app for the Humber Estuary SAC states that the lowest part of the new critical load range for upper saltmarsh (10 kg N/ha/yr) is most appropriate to the *'more densely vegetated upper marsh (e.g. EUNIS class MA223, MA224)'* with the highest part of the range being more appropriate for more frequently inundated marsh. Classes MA223 and MA224 are '*regularly but not daily flooded by seawater'* with a figure cited of 100-200 days/year[25].

4.7.17. In 2023, Natural England provided AECOM with the unpublished 2019 document 'Ref 1-107'. This contains the results of a survey of saltmarsh in the Humber Estuary SSSI. The areas of relevance to nitrogen deposition (air quality receptors O_E1 and O_E2 in **Plate 3** above, these being the only locations where the PC due to the project is forecast to exceed 1% of the critical load if a critical load of 10 kgN/ha/yr is used) are coincident with survey locations 78 and 81 on Appendix 1 of the Natural England report. Table 5 of the Natural England report identifies that the habitat present at survey locations 78 and 81 is primarily a species-poor stand of sea couch (*Elytrigia atherica*), NVC community SM24, with adjacent areas of NVC community SM6 (*Spartina anglica*) saltmarsh.

4.7.18. Sea couch is a common and widespread grass typical of higher saltmarshes but also found in many other circumstances including lower marsh and sand dunes. This reflects the fact that a large area of the identified habitat in **Plate 3** lies above the line of Mean High Water Springs, as sea couch is a species found in a wide range of estuarine environments. Section 2.3 of the Joint Nature Conservation Committee Common Standards Monitoring guidance for saltmarsh[26] thus classifies community SM24 as a 'drift line' community, rather than as 'pioneer saltmarsh', 'low-mid saltmarsh' or 'mid-upper saltmarsh' as it is not a species of conservation importance particularly in mono-specific stands. Similarly, APIS does not identify community SM24 as an 'Atlantic salt meadow' community (i.e. upper saltmarsh of ecological significance), which it restricts to communities SM10 to SM20, but rather classifies it more generally as an 'estuary' community. Sea couch grass has a high capacity for nitrogen

25 EUNIS -Factsheet for Atlantic upper-mid saltmarshes and saline and brackish reed, rush and sedge beds (europa.eu).
26 https://data.jncc.gov.uk/data/7607ac0b-f3d9-4660-9dda-0e538334ed86/CSM-SaltmarshHabitats-2004.pdf

assimilation such that nitrogen deposition will not adversely affect it. With regard to the adjacent areas of SM6, Section 2.3 of the JNCC Common Standards Monitoring guidance identifies community SM6 as 'pioneer saltmarsh'.

4.7.19. There is therefore good reason to conclude that the upper part (20 kgN/ha/yr) of the critical load range is appropriate for the affected areas of saltmarsh either because they represent pioneer saltmarsh (SM6) or because they are a nitrogen tolerant stand of a species of low conservation importance (SM24). Therefore, using a critical load of 20 kgN/ha/yr the additional predicted contribution from nitrogen emissions from the Project does not result in any exceedance of the Critical Load range for saltmarsh, even though the 1% of the critical load threshold is reached when new sources are considered 'in combination' under MARPOL II. **Table 19** shows that the modelled annual mean deposition rate at receptor O_E12 (the worst-case total deposition, not associated with an area of saltmarsh) will be 16.0 kg N/ha/yr, , while that at OE_1 and OE_2 will be 14.7 kgN/ha/yr, which are all well below the 20kgN/ha/yr critical load.

4.7.20. Moreover, guidance within the Highways Agency's Design Manual for Roads and Bridges (DMRB) in respect of Air Quality (Ref 1-238), identifies a threshold of 0.4 kg N/ ha/ yr as resulting in 'no significant effect' on all habitats based on Natural England Research Report NECR 210 (Ref 1-239), which collated dose response research and found that the lowest additional nitrogen deposition to reduce species richness in any habitat by one species was 0.4 kg/ N/ ha/ yr. The modelled cumulative Process Contribution from the Project at receptors OE_1 and OE_2 under the worst-case MARPOL Tier II Emissions Standards scenario is a maximum of 0.2 kg/ N/ ha/ yr according to **Table 19** (0.19 kgN/ha/yr from IGET and 0.02 kgN/ha/yr from other in combination sources). This is therefore well under the DMRB threshold for effecting a measurable change in vegetated habitat species diversity. Although the emissions to air arising from the Project are mainly from marine vessels, as the pollutants are the same as those assessed for road vehicle engine emissions in the DMRB, it is considered appropriate to apply this threshold in the assessment for the Project.

4.7.21. Moreover, it is important to note from APIS that the experimental studies which underlie conclusions regarding the sensitivity of saltmarsh have '… *neither used very realistic N doses nor input methods i.e. they have relied on a single large application more representative of agricultural discharge'*, which is far in excess of anything that would be deposited from the atmosphere. Generally, nitrogen inputs from the air are not as important to plants as nitrogen from other sources. Effects of nitrogen deposition from the atmosphere are likely to be dominated by much greater impacts from marine or agricultural sources. This is reflected on APIS itself, which states regarding saltmarsh that '*Overall, N deposition [from atmosphere] is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs'*. Another mitigating factor is that the nature of intertidal saltmarsh in the Humber Estuary means that there is daily flushing from tidal incursion. This is likely to further reduce the role of nitrogen from atmosphere in controlling botanical composition.

4.7.22. In addition, Natural England's Supplementary Advice on Conservation Objectives for the Humber Estuary SAC states that the conservation objective for the 'Atlantic salt meadows *Glauco-Puccinellietalia maritimae*' and '*Salicornia* and other annuals colonising mud and sand' habitat features relevant to the assessment of air quality effects is to "*Maintain concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature on the Air Pollution Information System*" (Ref 1-240). As set out above, the Process Contribution from the Project, which results in a mean deposition rate of 16 kg N/ ha/ yr on the nearest saltmarsh habitat does, not result in any exceedances of the Critical Load published on the APIS. Indeed, air quality modelling for this Project forecasts a slight improvement in nitrogen deposition between the base year and 2036 even when allowing for the Project. Therefore, the Project will not compromise the air quality 'maintain' target for the Humber Estuary SAC.

4.7.23. It is therefore concluded that operational emissions from marine vessels and landside plant will not adversely affect the integrity of designated habitats or undermine the conservation objectives within the Humber Estuary SAC.

4.7.24. Flaring will be used to control the release of ammonia in an emergency and during start up and shut down of the plant (which would include planned shutdowns for maintenance and any unplanned shutdowns required e.g. in the case of plant malfunction). This was not modelled because by definition not all such events are planned and the timing of unplanned events cannot be predicted but are of very short duration. Furthermore, the purpose of the flare would be to destroy the ammonia before it could have an environmental impact. Flaring ammonia typically has a +98% control efficiency. Moreover, fugitive emissions would be well dispersed at the nearest saltmarsh sites, given the distances involved. Since the critical level for ammonia and critical loads for nitrogen are based on annual averages very brief exposure would not be significant and the system will minimise the risk of any accidental release. For non-emergency accidental release, a leak detection system is to be employed. For these reasons no adverse effect on integrity will arise from operation of the plant.

*Mitigation*

4.7.25. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.7.26. Based on the evidence and assessment provided above and the justification in **Table 20**, operational vessel and landside plant emissions resulting in nitrogen deposition to saltmarsh habitat within the Humber Estuary SAC/ Ramsar are not considered to compromise any of the conservation objectives of the Humber Estuary SAC/ Ramsar, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 20: The potential for an AEOI due to physical change to qualifying habitats resulting from the deposition of Nitrogen and NOx from marine vessel and landside plant emissions during operation.**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand<br>H1330: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on the information provided above, air quality effects are considered to be negligible. On this basis the potential effects are not expected to cause a change to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Air quality effects on this scale will also not cause any changes to the *'the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |

## 4.8. Non-Toxic Contamination through Elevated Suspended Sediment Concentrations

**The potential effects of elevated SSC during capital dredging on qualifying habitats and species**

*General scientific context*

Elevated SSC: implications for benthic habitats and species

4.8.1. Dredging activities result in the suspension of disturbed sediment (Ref 1-69). Macrofauna living in estuarine systems which are subject to naturally high levels of SSCs are considered well adapted to living in highly turbid conditions. An increased level of suspended sediments may result in an increase in food availability and therefore growth and reproduction for surface deposit feeders (such as certain polychaetes) within estuarine environments that rely on a supply of nutrients at the sediment surface. However, food availability would only increase if the additional suspended sediment contained a significant proportion of organic matter, and the population would only be enhanced if food was previously limiting (Ref 1-72).

4.8.2. Greater energetic costs for benthic species could occur as a result of higher particle loads due to elevated suspended sediments stimulating the secretion of mucus to protect branchial or feeding structures of filter feeding organisms (Ref 1-108). SSCs have been found to have a negative linear relationship with sub-surface light attenuation. Light availability and water turbidity are principal factors in determining depth range at which kelp and other algae are recorded. In addition, certain mobile epistrate feeders (such as the amphipod *Bathyporeia* spp.) feed on diatoms within the sand grains and an increase in suspended solids that consequently reduced light penetration could alter food supply (Ref 1-71). However, longer-term changes in turbidity levels rather than temporary elevations are likely to be required to elicit any measurable changes in these species.

4.8.3. Elevated suspended sediment levels can also cause increased scouring and damage of epifaunal species due to the potentially abrasive action of the suspended sediment in flowing water.

4.8.4. Increased suspended sediments may favour the development of suspension feeders such as bivalves over other species. However, it should be noted that many benthic invertebrates can switch feeding modes depending on environmental conditions. The negative effects of suspended sediment may be particularly important during larval settlement in spring, with settling stages potentially being more sensitive to effects such as scour. However, this is generally thought to be of less concern where fauna are adapted to naturally high levels of suspended sediments (Ref 1-109).

4.8.5. In addition, the resuspension of sediments containing organic material can cause oxygen depletion within the water column and the subsequent settling of this organic rich sediment can deplete sediment oxygen levels, potentially affecting benthic species. Reductions in dissolved oxygen from suspended sediments as a result of dredging are generally considered to be minimal and short-lived. However, potential effects can be more pronounced if dredging causes the disturbance of high levels of oxygen-depleting substances and nutrients present in some very fine-grained sediment deposits and where a great portion originate from waste water (Ref 1-110).

4.8.6. Oxygen depletion in severe situations can lead to hypoxia with most research on the effects of reductions in dissolved oxygen on benthic fauna during hypoxic conditions. This occurs when oxygen is consumed (e.g., by decomposing organic matter, respiration and oxidation of reduced chemical species) faster than it is replenished (e.g., via air-water oxygen transfer, photosynthesis, and mixing) (Ref 1-111). Coastal and estuarine waters can be particularly susceptible to low oxygen conditions as sediments are organic-rich and impose high sediment oxygen demands. Highly stratified estuaries, in which surface and bottom waters do not mix, are more prone to hypoxia (Ref 1-111). Coastal areas are more likely to experience hypoxia during summer when high temperatures strengthen salinity stratification (Ref 1-112). Severe anoxic events can deplete the benthic invertebrate communities and cause a shift in community composition, through attrition of intolerant species and elevated dominance, as well as reductions in body size (Ref 1-113). In general, crustaceans and echinoderms are typically more sensitive to hypoxia, with lower oxygen thresholds, than annelids, molluscs and cnidarians (Ref 1-112).

#### Elevated SSC: implications for fish

4.8.7. Increased suspended sediments can lead to physiological effects in adult finfish resulting from the abrasion of sediment particles on gill tissues, causing reduced gill function and possible mortality (Ref 1-114 Ref 1-115). Such effects on fish are considered to occur at suspended sediment levels of around 10,000 mg/l (Ref 1-116). High SSC levels may impact spawning and nursery grounds through damage to eggs and planktonic larvae, as well as causing abrasion or clogging of the fragile gills of larval and juvenile fish, resulting in mortality or reduced growth rates.

4.8.8. Because turbidity often impairs visual acuity, activities and processes that require vision can be inhibited, leading to behavioural responses. For example, foraging in both planktivorous and piscivorous fish can be negatively affected by suspended sediments. Piscivores are especially sensitive to increasing turbidity because many are visual hunters that detect prey from a distance. An increase in suspended sediment reduces both light and contrast, decreasing encounter distances between predator and prey (Ref 1-114).

4.8.9. Elevated suspended sediments can also influence the movements and migration of fish with some species have been observed actively avoiding moving through areas with suspended sediment plumes (Ref 1-114; Ref 1-115). However, such responses can cease if fish become acclimatised. Fish in high latitude coastal areas typically have to contend with variable turbidity and often poor visual conditions, resulting from fluctuations in ambient light levels, suspended sediments and in the light transmission properties of the water. For example, concentrations as high as 9,000 mg/l have been recorded in the path of salmon runs in the Usk Estuary (Ref 1-117). Similarly, lamprey and shad species have been known to successfully pass through estuaries with extremely high suspended sediments and, therefore, can be considered tolerant of turbid conditions (Ref 1-118). The mobile nature of fish species generally allows avoidance of areas of adverse conditions which are unlikely to significantly affect a population provided such conditions are temporary.

4.8.10. The resuspension of sediments containing organic material can cause oxygen depletion within the water column. The subsequent settling of this organic rich sediment can deplete the sediments of oxygen and affect benthic prey items used by fish. The response of fish to low concentrations of dissolved oxygen is determined by a range of factors, including the duration of exposure, water temperature and the presence of other pollutants (Ref 1-114). The duration of any low dissolved oxygen event is a key factor in determining its effect. Most fish would survive an extremely low concentration of dissolved oxygen, such as 2 mg/l, for a few minutes, but a longer exposure would start to have sub-lethal and eventually lethal effects (Ref 1-119).

*Summary of effects*

Effects on benthic habitats and species

4.8.11. The changes in SSC that are predicted to occur as a result of the capital dredge are presented in **Chapter 16: Physical Processes [APP-058]**. In summary, the increased concentrations arising from the capital dredge will be of a lower magnitude and persist for a shorter distance (and time) than that from disposal activity which is summarised below.

4.8.12. Naturally very high SSC typically occur year-round in the Humber Estuary, particularly during the winter months when storm events disturb the seabed and on spring tides (Ref 1-120; Ref 1-121). The estuarine benthic communities recorded on mudflats and the shallow mud occur commonly in this region and are considered tolerant to this highly turbid environment (Ref 1-35; Ref 1-36; Ref 1-37). The predicted SSCs are within the range that can frequently occur naturally and also as a result of ongoing dredge and disposal activity (**Chapter 16: Physical Processes [APP-058]**).

4.8.13. With respect to dissolved oxygen, increases in SSC will be brief and localised and there is not expected to be a significant reduction in dissolved oxygen nor therefore any implications for benthic species and habitats.

Effects on fish

4.8.14. As highlighted above, migratory fish including lamprey are known to migrate through estuaries with high SSC to reach spawning areas (including the Humber Estuary which is considered one of the estuaries in the UK with the highest levels of SSCs) (Ref 1-118; Ref 1-114; Ref 1-115; Ref 1-120; Ref 1-121). Elevated SSCs due to dredging are expected to be of a magnitude that can occur naturally during migratory periods for lamprey or as a result of ongoing maintenance dredging/disposal.

4.8.15. Sediment plumes resulting from dredging will be localised (in the context of the entire width of the estuary). It is considered that they will dissipate rapidly and be immeasurable against background levels within a short duration of time (less than a single tidal cycle) as described in more detail in the Physical Processes assessment (**Chapter 16: Physical Processes [APP-058]**). Therefore, lamprey will also be able to avoid the temporary sediment plumes. Based on these factors there is considered to be limited potential for migrating fish to be adversely affected by the predicted changes in SSC.

4.8.16. Given that elevated SSCs due to dredge are considered to be in the range of variability that can occur naturally in the Humber Estuary (which has very high SSCs year-round) as well as due to ongoing maintenance dredging/disposal and that plumes will be temporary in nature, sensitive life stages of fish occurring in the region such as larvae and juvenile fish are considered unlikely to be adversely affected by the dredging.

4.8.17. With respect to dissolved oxygen, increases in SSC will be brief and localised and there is not expected to be a reduction in dissolved oxygen and therefore a response by fish is not anticipated.

*Mitigation*

4.8.18. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.8.19. The predicted changes in SSCs during capital dredging are within the range that can frequently occur naturally and also as a result of ongoing dredge and disposal activity (see above and **Table 21**). The predicted effects on habitats and species are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 21: The potential for an AEOI on qualifying habitats and species due to elevated SSC during capital dredging**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Benthic habitats and species within the local area are considered to be well adapted to high suspended sediment conditions. Elevated SSCs due to dredging are predicted to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to cause changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated SSCs of this magnitude will also, therefore, not cause any changes to the *'the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Lamprey regularly migrate through estuaries with very high SSC (including the Humber Estuary). In addition, the elevated SSCs due to dredging are predicted to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives<br><br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely*' conservation objectives. |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance: | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the | Benthic habitats and species within the local area are considered to be well adapted to high suspended sediment conditions. Elevated SSCs due to dredging are predicted to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | qualifying interest features. | cause changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated SSCs of this magnitude will also, therefore, not cause any changes to the *'the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely*' conservation objectives. |
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Lamprey regularly migrate through estuaries with very high SSC (including the Humber Estuary). In addition, the elevated SSCs due to dredging are predicted to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives<br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely'* conservation objectives. |

**The potential effects of elevated SSC during capital dredge disposal on qualifying habitats and species**

*General scientific context*

4.8.20. Scientific evidence on this impact pathway is provided in Paragraphs 4.8.1 to 4.8.10.

*Summary of effects*

Effects on benthic habitats and species

4.8.21. The changes in SSC that are predicted to occur as a result of the capital dredge disposal are presented in **Chapter 16: Physical Processes [APP-058]**. In summary, the dredge disposal is predicted to produce peak SSC of around 600 to 800 mg/l above background at the disposal site, reducing to typically 100 to 200 mg/l within a distance of around 7km from the source. These peak increases are predicted to persist at any given location for a single modelled timestep (10 minutes) before the tidal forcing carries the plume further up or down estuary on the respective flood or ebb tide. SSCs of this magnitude are considered to regularly occur naturally or as a result of ongoing maintenance dredging/disposal. Upstream of Hull and downstream (within the outer estuary), maximum SSC levels are lower; generally, between 20 and 100 mg/l above background, as the tidal excursion from the disposal site limits the extent of the resultant plume. However, in reality due to the existing high SSC that typically occurs in the Humber Estuary, the predicted increase in concentrations resulting from the disposal is likely to become immeasurable (against background) within approximately 1km of the disposal site. The measurable plume from each disposal operation is also only likely to persist for a single tidal cycle (less than 6 hours from disposal) as after this time the dispersion under the peak flood or ebb tidal flows means concentrations will have reverted to background levels.

4.8.22. Naturally very high SSCs typically occur year-round in the Humber Estuary, particularly during the winter months when storm events disturb the seabed and on spring tides. The estuarine benthic communities recorded within the disposal ground and surrounding area were found to be of low ecological value but are considered characteristic of the 'Sandbanks which are slightly covered by sea water all the time' feature. The benthic communities have low sensitivity to increases in suspended sediments and are considered tolerant to this highly turbid environment (Ref 1-35; Ref 1-36; Ref 1-37). The predicted SSCs are within the range that can frequently occur naturally and also as a result of ongoing dredge and disposal activity (**Chapter 16: Physical Processes [APP-058]**).

4.8.23. The disposal of sediment will temporarily increase SSC, however, due to the strong hydrodynamic conditions in the area, these temporary elevations in SSC are expected to dissipate rapidly to background concentrations. With respect to dissolved oxygen, increases in SSC will be brief and localised and there is not expected to be a significant reduction in dissolved oxygen nor therefore any implications for benthic species and habitats.

Effects on fish

4.8.24. The changes in SSC are described above in paragraph 4.8.21. Migratory species including lamprey are known to migrate through estuaries with high SSC (including the Humber Estuary which is considered one of the estuaries in the UK with the highest levels of SSC) (Ref 1-120) and the predicted SSC are within the range that can frequently occur naturally and also as a result of ongoing dredge and disposal activity. Sediment plumes resulting from disposal will also be localised in the context of the entire width of the estuary. Therefore, salmonids and other migratory fish would also be able to avoid the temporary sediment plumes and sensitive life stages of fish occurring in the region such as larvae and juvenile fish are considered unlikely to be adversely affected by the dredging.

4.8.25. With respect to dissolved oxygen, increases in SSC will be brief and localised and there is not expected to be a significant reduction in dissolved oxygen as assessed in the Water and Sediment Quality assessment (**Chapter 17: Marine Water and Sediment Quality [APP-059]**). Effects on lamprey are therefore considered to be negligible.

*Mitigation*

4.8.26. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.8.27. The predicted changes in SSCs during capital dredge disposal are within the range that can frequently occur naturally and also as a result of ongoing dredge and disposal activity (see above and **Table 22**). The predicted effects on habitats and species are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 22: The potential for an AEOI on qualifying habitats and species due to elevated SSC during capital dredge disposal**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Benthic habitats and species within the local area are considered well adapted to high suspended sediment conditions. Elevated SSCs due to dredging are predicted to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to cause changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated SSCs of this magnitude will also, therefore, not cause any changes to the *'the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Lamprey regularly migrate through estuaries with high SSC (including the Humber Estuary). In addition, the elevated SSCs due to dredge disposal are considered to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives<br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely*' conservation objectives. |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the | Benthic habitats and species within the local area are considered well adapted to high suspended sediment conditions. Elevated SSCs due to dredging are predicted to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to cause |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | qualifying interest features. | changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated SSCs of this magnitude will also, therefore, not cause any changes to the *'the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Lamprey regularly migrate through estuaries with high SSC (including the Humber Estuary). In addition, the elevated SSCs due to dredge disposal are considered to be of a magnitude that can occur naturally or as a result of ongoing maintenance dredging/disposal. On this basis the localised and temporary effects are not considered to cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives<br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely'* conservation objectives. |

## 4.9. Toxic Contamination through Release of Toxic Contaminants Bound in Sediments, And Accidental Oil, Fuel or Chemical Releases

**The potential effects of the release of contaminants during capital dredging on qualifying habitats and species**

*General scientific context*

Release of contaminants: implications for benthic habitats and species

4.9.1. Benthic habitats and species are sensitive to toxic contamination (where concentrations of contaminants exceed sensitivity thresholds). Toxic contamination during construction can occur as a result of the release of synthetic contaminants such as fuels and oils or through the resuspension of sediment as a result of the disturbance of the seabed which can lead to the release and mobilisation of sediment-bound contaminants into the water column. These include both toxic contaminants, such as heavy metals, pesticides and hydrocarbons, and non-toxic contaminants, such as nutrients. In particular, there is a risk that any uncontrolled releases of materials or sediments into the water column could make contaminants temporarily available for uptake by marine organisms. Over the longer-term any such releases could also become stored in the surface sediments of benthic habitats for future benthic uptake.

4.9.2. Suspension-feeding organisms may be particularly vulnerable to pollutants in the water column due to their dependence on filtration (Ref 1-71). High levels of chemical contaminants can potentially cause genetic, reproductive and morphological disorders in marine species. Contaminants may also have combined effects. Studies have suggested links between contamination with polycyclic aromatic hydrocarbons (“PAHs”), polychlorinated biphenyl (“PCBs”), amines and metals and a range of disorders (Ref 1-122). Increased incidence of tumours, neoplasia, deoxyribonucleic acid (“DNA”) damage, polyploidy, hypoploidy, hermaphroditism and reduced immune response have all been reported in marine invertebrates in areas of high levels of pollution (Ref 1-123; Ref 1-124; Ref 1-125; Ref 1-126; Ref 1-127; Ref 1-128. Another highly researched pollutant is Tributyltin (“TBT”), which has toxic effects in a wide variety of biota, whereas inorganic tin is less toxic. TBT effects include lethal toxicity and effects on growth, reproduction, physiology, and behaviour. Several of the negative effects are due to interferences with the endocrine function, as occurs in the phenomenon imposex. Imposex is the superimposition of male organs onto females of gastropods, which are normally a dioecious species (Ref 1-129).

4.9.3. Sub-lethal effects of chemical contamination on marine invertebrates can reduce the fitness of individual species. Lethal effects may allow a shift in community composition to one dominated by pollution-tolerant species such as oligochaete worms (Ref 1-130). A reduction in community species richness is associated with elevated levels of pollutants. Contamination with PAHs, for example, leads to high levels of mortality in amphipod and shrimp species, and decreased benthic diversity (Ref 1-131). Similar reductions in diversity are linked with heavy metal contamination (Ref 1-132). Polychaete worms are thought to be quite tolerant of heavy metal contamination, whereas crustaceans and bivalves are considered to be intolerant (Ref 1-133).

Release of contaminants: implications for fish

4.9.4. The potential release of contaminants during construction and dredging activities may result in those contaminants becoming available for uptake by any fish in the water column or on surface sediments. There is an indirect risk to some finfish species as sediment-bound contaminants may temporarily bioaccumulate in the tissues of certain fish prey, such as polychaete worms and marine bivalves, and made available for uptake by feeding fish.

4.9.5. The influence of contaminated sediments is considered to have a greater impact on fish than elevated SSC with a range of evidence suggesting that direct exposure to contaminants negatively effects fish (Ref 1-114). Hydrophobic contaminants (such as legacy persistent organic pollutants including PCBs and organochlorine pesticides) as well as high-molecular weight polyaromatic and aliphatic hydrocarbons (such as PAHs), are closely associated with organic material in sediments. These contaminants have been linked to a range of potential reproductive impacts on adult fish (e.g., steroidogenesis, vitellogenesis, gamete production or spawning success) as well as lethal and non-lethal developmental (spinal and organ development, growth) impacts on embryos and larvae (Ref 1-134).

4.9.6. Demersal fish species, such as dab and flounder, which remain close to the seabed and feed mainly on benthic organisms, would experience a higher exposure to contaminated sediments than pelagic fish such as herring.

*Summary of effects*

Effects on benthic habitats and species

4.9.7. The potential to impact the marine environment as a result of any sediment-bound contaminants arises primarily when the sediment that is released into the water column disperses and deposits elsewhere. However, it should be noted that the majority of material disturbed during capital dredging works will be lifted from the bed to the hopper/barge, with only a small proportion raised into suspension and remaining in the water column (i.e., through abrasion pressure from the draghead/bucket).

4.9.8. Sampling and subsequent chemical analysis has been undertaken in accordance with the agreed MMO sample plan. The results of this analysis are summarised in more detail in the Marine Water and Sediment Quality assessment (**Chapter 17: Marine Water and Sediment Quality [APP-059]**) and show the majority of contaminants in the sediments of the proposed dredge area are at relatively low concentrations, mostly below, or marginally exceeding, Cefas Action Level 1 (AL1). There were no exceedances of Action level 2 (AL2) in any sediment samples analysed.

4.9.9. Based on the chemical analysis, there are low levels of contamination in sediments in the proposed dredge area. Only a small proportion of disturbed material is expected to be raised into suspension and this material will be rapidly dispersed by strong tidal currents in the area. Significant elevations in the water column contamination are, therefore, not anticipated. Based on these factors, the benthic communities would have no or very limited exposure to contaminants and not at concentrations of contaminants that would constitute a lethal or sub-lethal effect. The effects on subtidal and intertidal benthic communities from the release of contaminants during capital dredging is considered inconsequential.

Effects on fish

4.9.10. As described above in **Paragraph 4.9.8** low levels of contamination were found in the sediment contamination samples. Significant elevations in the concentrations of contaminants within the water column are not anticipated. Based on these factors, it is unlikely that fish including lamprey species would be exposed to elevated levels of contaminants during capital dredging and therefore effects on fish species are unlikely.

*Mitigation*

4.9.11. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.9.12. Significant elevations in the concentrations of contaminants are not anticipated during capital dredging based on the results of the site-specific sampling (see above and **Table 23**). The predicted effects on qualifying habitats and species are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 23: The potential for an AEOI on qualifying habitats and species the release of contaminants during capital dredging**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1130: Estuaries | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on existing available information summarised above, the overall level of contamination in the proposed dredge area is considered to be low with only a small proportion of disturbed material expected to be raised into suspension. This material will be rapidly dispersed by strong tidal currents in the area. Significant elevations in the water column contamination are, therefore, not anticipated. Based on these factors, the magnitude of change to marine habitats and species is considered to be negligible. On this basis the localised and temporary effects are not considered to cause changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated contamination levels of this magnitude will also not cause any changes to the '*the structure and function of qualifying natural habitats*' or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | H1140: Mudflats and sandflats not covered by seawater at low tide | | |
| | S1095: Sea lamprey *Petromyzon marinus* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on existing available information summarised above, the localised and temporary potential changes are considered to cause negligible effects in lamprey and will not cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives.<br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely'* conservation objectives. |
| | S1099: River lamprey *Lampetra fluviatilis* | | |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance: | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the | Based on existing available information summarised above, the overall level of contamination in the proposed dredge area is considered to be low with only a small proportion of disturbed material expected to be raised into suspension. This material will be rapidly dispersed by strong tidal currents in the area. Significant elevations in the water column |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | qualifying interest features. | contamination are, therefore, not anticipated. Based on these factors, the magnitude of change to marine habitats and species is considered to be negligible. On this basis the localised and temporary effects are not considered to cause changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated contamination levels of this magnitude will also not cause any changes to the '*the structure and function of qualifying natural habitats*' or cause modifications to '*the supporting processes on which qualifying natural habitats rely'* conservation objectives. |
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br><br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on existing available information summarised above, the localised and temporary potential changes are considered to cause negligible effects in lamprey and will not cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives.<br><br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely'* conservation objectives. |

**The potential effects of the release of contaminants during capital dredge disposal on qualifying habitats and species**

*General scientific context*

4.9.13. Scientific evidence on this impact pathway is provided in Paragraphs 4.9.1 to 4.9.6.

*Summary of effects*

Effects on benthic habitats and species

4.9.14. The results of the sediment contamination sampling are summarised above and in the Water and Sediment Quality assessment (**Chapter 17: Marine Water and Sediment Quality [APP-059]**). In summary, low levels of contamination were found in the samples and there is no reason to believe the sediment will be unsuitable for disposal in the marine environment.

4.9.15. During disposal, sediment will be rapidly dispersed in the water column. Therefore, the already low levels of contaminants in the dredged sediments will be dispersed further. The probability of changes in water quality occurring at the disposal site is considered to be low. The material will be rapidly dispersed by strong tidal currents in the area. Significant elevations in the water column contamination are, therefore, not anticipated. Based on these factors, the benthic communities at the disposal site would have no or very limited exposure to contaminants and not at concentrations of contaminants that would constitute a lethal or sub-lethal effect. The effects on subtidal and intertidal benthic communities from the release of contaminants during capital dredge disposal is considered inconsequential.

Effects on fish

4.9.16. Significant elevations in the concentrations of contaminants within the water column are not anticipated (**Paragraph 4.9.14**). Based on these factors, it is unlikely that fish would be exposed to elevated levels of contaminants during capital dredge disposal and therefore effects on fish species are unlikely.

*Mitigation*

4.9.17. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.9.18. Significant elevations in the concentrations of contaminants are not anticipated during capital dredge disposal based on the results of the site-specific sampling (see above and **Table 24**). The predicted effects on qualifying habitats and species are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 24: The potential for an AEOI on qualifying habitats and species the release of contaminants during capital dredging disposal**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1110: Sandbanks which are slightly covered by sea water all the time | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Given the low levels of contamination found in the samples and the high level of dispersal expected as the disposal sites, subtidal habitats and species found in the vicinity of the disposal sites are not expected to be vulnerable to the potential release of sediment bound contaminants which could occur as a result of the disposal of the capital dredged arisings.<br>On this basis the localised and temporary effects are not considered to cause changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated contamination levels of this magnitude will also not cause any changes to the '*the structure and function of qualifying natural habitats*' or cause modifications to 'the supporting processes on which qualifying natural habitats rely' conservation objectives. |
| | H1130: Estuaries | | |
| | S1095: Sea lamprey *Petromyzon marinus* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on existing available information summarised above, the localised and temporary potential changes are considered to cause negligible effects in lamprey and will not cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives.<br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely'* conservation objectives. |
| | S1099: River lamprey *Lampetra fluviatilis* | | |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance: | In the context of the site's conservation objectives, there is considered to be no | Given the low levels of contamination found in the samples and the high level of dispersal expected as the disposal sites, subtidal habitats and species found in the vicinity of the disposal sites are not expected to be vulnerable to the potential release of sediment bound |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | potential AEOI on the qualifying interest features. | contaminants which could occur as a result of the disposal of the capital dredged arisings.<br>On this basis the localised and temporary effects are not considered to cause changes to '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species*' conservation objective. Elevated contamination levels of this magnitude will also not cause any changes to the '*the structure and function of qualifying natural habitats*' or cause modifications to 'the supporting processes on which qualifying natural habitats rely' conservation objectives. |
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Based on existing available information summarised above, the localised and temporary potential changes are considered to cause negligible effects in lamprey and will not cause changes to '*the population of each of the qualifying features'* or the '*distribution of the qualifying features within the site'* conservation objectives.<br>This pathway would also not cause any changes to '*the extent and distribution of the habitats of the qualifying features'* or the '*supporting processes on which the habitats of the qualifying features rely'* conservation objectives. |

## 4.10. Airborne Noise and Visual Disturbance

**The potential effects of airborne noise and visual disturbance during construction on qualifying species of coastal waterbird within the SPA/Ramsar boundary**

*General scientific context*

Introduction

4.10.1. Disturbance can cause birds to cease feeding, which can decrease the total amount of time available for feeding, as well as disrupting other behaviour such as breeding (Ref 1-135; Ref 1-136). Where disturbance causes birds to take flight, it can increase energy demands and may increase food consumption by decreasing the available habitat area (Ref 1-137; Ref 1-138; Ref 1-139. Repetitive disturbance events can result in possible long-term effects such as loss of weight, condition and a reduction in reproductive success, leading to population impacts (Ref 1-140; Ref 1-141; Ref 1-142). Birds typically show a dispersive response to disturbance with prolonged disturbance causing displacement (Ref 1-137; Ref 1-143; Ref 1-144).

4.10.2. Disturbance often occurs through a combination of simultaneous visual and noise stimuli, although some occurrences may be through separate visual or noise stimuli (Ref 1-14). Birds will also vary their response to human activities depending on the type of the activity, the noise produced, the speed and randomness of approach, the distance to which the disturbance factor approaches and the frequency of disturbance (Ref 1-145., Ref 1-146; Ref 1-147; Ref 1-135; Ref 1-148; Ref 1-149).

Disturbance responses associated with construction activity

4.10.3. Construction activity in the coastal zone may lead to disturbance which has the potential to cause a reduction in foraging activity as well as temporary displacement from a localised area around the works (Ref 1-145).

4.10.4. Overall, responses to construction noise and activity appear to initiate similar or less disturbance than that of human presence on the foreshore (e.g., recreation) (Ref 1-150; Ref 1-151; Ref 1-152; Ref 1-153). For example, while some localised disturbance was caused as a result of piling activity as part of the construction work for ABB Power Generation Ltd (Pyewipe, Grimsby), this was not considered to have a major effect on surrounding bird populations and was found to be no greater than the effect arising from third party disturbance, including walkers and stopped cyclists, which were unrelated to the ABB works (Ref 1-150). The greater effect of human presence as opposed to general construction works and machinery is also supported by Institute of Estuarine and Coastal Services (“IECS”) (Ref 1-152), in that a person approaching feeding birds on the mudflat caused birds to fly when the person was approximately 300m from the birds, whereas machinery could approach birds up to 50m before the birds moved away.

4.10.5. Lower levels of disturbance for construction activities compared with other nearby human activity was also observed during bird monitoring as part of the marine licensing consent for a quay wall construction development at the Port of Southampton. The study evaluated the disturbance effects of the extension work on waterbird species using the mudflat habitat on Bury Marsh opposite the Port of Southampton (approximately 100 to 200m away) during the overwinter period. No bird disturbance behaviour (such as startling, rapid flight or abruptly stopping foraging) was observed during periods of percussive piling activity. However, disturbance to waterbirds was observed on several occasions due to vessels and kayaks within 50m of Bury Marsh (Ref 1-151).

4.10.6. Studies into the distances from activities that evoke a disturbance response (or flight initiation distance ("FID")) suggest that for most coastal works and other foreshore activity in areas where birds are likely to be habituated to some extent to disturbance due to existing anthropogenic activity, disturbance behaviour is not typically observed when activities occur more than some 200m away from a source with the reactions of many species occurring between 20 and 100m (Ref 1-154; Ref 1-148; Ref 1-155; Ref 1-156; Ref 1-157; Ref 1-143; Ref 1-153; Ref 1-158 Ref 1-159; Ref 1-160; Ref 1-161; Ref 1-151). This is discussed in more detail in **Table 25**.

4.10.7. Construction techniques which are known to cause loud source noise levels (such as piling) have been the subject of a number of disturbance monitoring studies which have investigated the relationship between activity source levels and the disturbance responses elicited by birds (Ref 1-155; Ref 1-162; Ref 1-14; Ref 1-154; Ref 1-153). Research suggests that irregular construction noise at levels typically above 70 dB can cause behavioural responses in some waterbird species with flight responses generally occurring above 80 dB (**Table 25**). However, responses of birds will be dependent on a range of site-specific factors including ambient (background) noise levels, time of year, levels of existing activity and the species assemblage. In addition, visual disturbance associated with construction activity will often create a disturbance effect before any associated noise starts to have an effect (Ref 1-153).

4.10.8. Birds generally appear to habituate to continuous noise as long as there is no large amplitude 'startling' component (Ref 1-163). With specific respect to piling, it has been concluded that although piling has the potential to create the loudest noise during construction; it often consists of rhythmic "bangs", which birds might become accustomed to depending on the distance that birds are away from the piling (Ref 1-164). For example, observations as part of the construction work for ABB Power Generation Ltd (Pyewipe) suggested that it was the initial sudden strikes during piling activities, which caused some localised disturbance, and that subsequent bangs typically resulted in reduced disturbance, demonstrating habituation (Ref 1-150).

**Table 25: Summary of noise and piling disturbance studies**

| Study | Summary |
|---|---|
| IECS, 2009a;Ref 1-155 IECS, 2009b Ref 1-157 | A study of coastal construction noise effects on the Humber Estuary was undertaken based around the measurement of noise levels while simultaneously monitoring the behavioural response by birds during flood defence works at Saltend. The defence works involved the use of a double hydraulic pile on site. The study noted a moderate to high behavioural response to irregular piling noise above 70 dB and a moderate response to regular piling noise below 70 dB. A flight response was noted to occur during works generating noise at between 80-85 dB. Behavioural responses, notably the down-shore movements of wildfowl were noted above 70 dB. Noise levels between 55 dB and 84 dB were generally accepted by birds. Other impacts associated with construction included a high response to personnel and plant equipment on the mudflat and a moderate to high response to personnel and plant equipment on the seaward toe and crest. Occasional movement of a crane jib and load resulted in a low to moderate response. Noises below 50 dB, long-term plant activities only on the crest and activity behind the flood bank elicited a low response. |
| Xodus, 2012 Ref 1-162 | Monitoring of birds as part of the Grimsby River Terminal Project found that noise from construction (including piling) caused only 1% of the disturbance events observed, with large disturbances mainly caused by the presence of raptors, aircraft and helicopters. The study concluded that percussive piling noise less than 66 dB LAmax F gave rise to no disturbance, whilst a mild behavioural response (such as heads up alert, short walk or swimming) was observed to occur in the range of 73 to 81 dB LAmax F. Percussive piling noise over 83 dB LAmax F was considered likely to evoke a flight response. |
| Wright et al., 2013 Ref 1-14 | The experimental study intentionally disturbed birds at a high tide roost site, on the south bank of the Humber estuary using an impulsive sound similar to that associated with noise from port and power generation construction such as percussive piling and recorded the behavioural responses. Lapwing appeared to be the species most sensitive to intentional disturbance, while Curlew was the most tolerant. The study recommended that impulsive noise limits should be restricted to < 69.9 dB at the site. |
| ABPmer, 2002 Ref 1-154 | Disturbance monitoring of waterbirds in the vicinity of construction works (piling and dredging) at the ABP Teignmouth Quay Development concluded that sudden noise in the region of 80 dB appears to elicit a flight response in waders up to 250m from the source, with levels of approximately 70 dB causing flight or anxiety behaviour in some species. |
| Institute of Estuarine and Coastal Studies 2009a (Ref 1-155). | Disturbance monitoring along a 1.5km stretch of coastline near Pyewipe, Grimsby of piling works centred on the South Humber Bank Power Station found that birds appeared indifferent to the noise of piling from the landward side of the seawall, and the numbers and distribution of birds on the mudflat at low tides was similar during periods of piling and periods with no piling. Piling on the seaward side of the seawall only resulted in minor disturbance to birds immediately adjacent to the seawall, but feeding flocks appeared tolerant of piling noise at a distance of approximately 200 m (Ref 1-155). |

| Study | Summary |
|---|---|
| Scott Wilson. (2009).Ref 1-156 | Ornithological monitoring at Hartlepool found that birds feeding on mudflats at low tide were largely unaffected by marine piling activity to construct a new quay wall circa 200 m from the nearest mudflat, with only one significant disturbance event (causing a flock of gulls to leave the sector and not return) during the two month winter monitoring period (Ref 1-156). All marine piling at the Hartlepool site employed a 'soft-start' procedure, where noise levels are gradually increased to minimise the impact of a sudden sharp increase in noise. |
| ABPmer. (2013). Ref 1-151 | Bird monitoring as part of the marine licensing consent for a quay wall construction development at the Port of Southampton evaluated the disturbance effects of percussive piling on waterbird species using the mudflat habitat on Bury Marsh opposite the Port of Southampton (approximately 100 to 200 m away) during the overwinter period. No bird disturbance behaviour (such as startling, rapid flight or abruptly stopping foraging) was observed during monitoring periods of percussive piling activity. However, disturbance to waterbirds was observed on several occasions due to vessels and kayaks within 50 m of Bury Marsh (Ref 1-151). |

Species sensitivity and responses

4.10.9. The level of response to potential disturbance stimuli also varies considerably between species with some ducks (such as Shelduck) and larger waders such as Curlew and godwits generally showing stronger responses to disturbance stimuli than smaller waders (such as Turnstone and Dunlin) (Ref 1-159; Ref 1-161; Ref 1-165; Ref 1-153; Ref 1-160; Ref 1-166)). A detailed review of the responses and sensitivity of key waterbird species to noise and visual disturbance is presented in **Table 26**. This includes data on FID which is the distance at which a bird takes flight in response to a perceived danger and is used to help better understand the relative sensitivity of different species to disturbance.

4.10.10. The response to disturbance is also dependant on the previous experience of the birds to disturbance (i.e., level of habituation) as well as a range of other factors such as environmental conditions, their state at the time of the disturbance (e.g., hungry or satiated) and the quality of their alternative foraging sites (Ref 1-167; Ref 1-155 Ref 1-159).

4.10.11. It is also important to understand potential behavioural responses of disturbance in the context of energetic costs, mortality and population consequences as some disturbance has been shown to have limited adverse effects on waterbirds. For example, Goss-Custard *et al*. (Ref 1-141) used an individual-based behavioural model to establish critical thresholds for the frequency with which wading birds can be disturbed before they die of starvation. The model was tested on oystercatchers in the Baie de Somme, France, where birds were put to flight by disturbance up to 1.73 times/daylight hour. The modelling results showed that the birds could be disturbed up to 1.0 to 1.5 times/h before their fitness was reduced in winters with good feeding conditions (abundant cockles and mild weather) but only up to 0.2 to 0.5 times/h when feeding conditions were poor (scarce cockles and severe winter weather).

4.10.12. Collop *et al.* (Ref 1-159) looked into the likely consequences of different frequencies of disturbance on various wading birds, using their data on mean flight time and mean total time lost. The authors found that a 5% reduction in birds' daily available feeding time would be expected to result from responding to between 38 and 162 separate disturbance events (depending on species and tidal stage). The mean cost per individual flight response represented less than a tenth of a per cent of each species' daily energy requirements. The study concluded that the energetic costs of individual disturbance events were low relative to daily requirements and unlikely to be frequent enough to seriously limit foraging time.

**Table 26: Summary of evidence of the sensitivity for different key species to noise and visual disturbance stimuli**

| Species | Sensitivity to noise and visual disturbance | |
|---|---|---|
| | Evidence on the sensitivity to disturbance stimuli | Sensitivity level[1] |
| Shelduck | Shelduck are generally a wary species and are considered particularly sensitive to visual disturbance. Typically, they approach construction works no closer than 300m and can be affected by visual disturbance up to 500m away from source (Ref 1-153).<br>Noise disturbance has been reported from 72 dB upwards for Shelduck. However, the species is subject to a high degree of habituation and further exposure to sounds of the same or greater level can lead to no response to stimuli. No response has been recorded for noise levels as high as 88 dB but this is likely to be an extreme 'no response' level and caution should be exercised at receptor levels over 70 dB. Observation of disturbance responses from flood protection works has suggested that Shelduck react to noise in approximately 30% of exposure events to sudden noise above 60 dB or any noise above 70 dB (Ref 1-153).<br>Goodship and Furness Ref 1-161) assessed Shelduck as having a high sensitivity to human disturbance with the range in mean FID from the literature reviewed of 36m to 250m as a result of the presence of people on or near the foreshore although FIDs up to 700m have been recorded.<br>Goodship and Furness (Ref 1-160) undertook a disturbance literature review and assessed Shelduck as one of the species considered most sensitive to disturbance stimuli with the range in mean FID from the literature reviewed of 148m to 250m as a result of the presence of people on or near the foreshore. | Moderate to high |
| Curlew | Research evidence indicates that Curlew are a cautious species that does not habituate to works rapidly and are also particularly intolerant of people, allowing approach to a range of typically 120-300m before flushing (i.e. a flight response) (Ref 1-153; Ref 1-168).<br>Goodship and Furness Ref 1-161) assessed Curlew as having a high sensitivity to human disturbance with the with the range in mean FID from the literature reviewed of 38m to 340m as a result of the presence of people on or near the foreshore with motorised vessels having a mean FID of 140m and motorised vehicles 188m.<br>Collop et al., (Ref 1-159) recorded a minimum FID of 88m and a maximum FID of 570m (with a mean of 340m) for this species through experimentally disturbing foraging birds (approaching a total of 39 times) as part of a research study. | Moderate to high |

| Species | Sensitivity to noise and visual disturbance | |
|---|---|---|
| | **Evidence on the sensitivity to disturbance stimuli** | **Sensitivity level[1]** |
| | Goodship and Furness (Ref 1-160) undertook a disturbance literature review and assessed Curlew as one of the species considered most sensitive to disturbance stimuli with the range in mean FID from the literature reviewed of 38m to 340m as a result of the presence of people on or near the foreshore with motorised vessels having a mean FID of 140m. | |
| Black-tailed Godwit | Disturbance responses have been recorded at distances over 100m from construction activity (Ref 1-153). Goodship and Furness (Ref 1-161) found evidence of FIDs between 20 and 150m as a result of presence of people on or near the foreshore from the literature reviewed in the study. This study also considered this species to have a relatively high tolerance towards human disturbance and appear to be able to habituate to human activities. The study concluded that a buffer zone of 100-200m was considered appropriate with respect to disturbance in the non-breeding season. Burton *et al*. (Ref 1-169 also considered overwintering Black-tailed Godwit to be one of the most tolerant species to potential disturbance with a 200m zone recommended to avoid disturbance to this species (and other waterbirds). Gill *et al.* (Ref 1-170) found no evidence that human presence reduced the number of Black-tailed Godwits with the authors finding that the presence of infrastructure (as such as marinas/small ports or footpaths) did not impact the number of godwits supported by the food supply on the adjacent mudflats. This study compared marinas/ports against reference sites that contained similar sediment type and fauna but was far enough away (> 200m) to be considered unaffected by human activity at a marina. A study investigating human disturbance on Black-tailed Godwit, Curlew and Teal in Co. Cork, Ireland, found that out of the three species, Black-tailed Godwits were the least affected by disturbance events and were likely to move <50m from their original position when a disturbance event occurred (Ref 1-171). Specifically on the Humber Estuary, Percival (Ref 1-172) found that Black-tailed godwits in the Humber Estuary appear to be tolerant of a relatively high disturbance environment. Black-tailed Godwits roost at high tide on the North Killingholme Haven Pits which are located in an area adjacent to port infrastructure. There was no evidence found in this study that industrialisation had reduced the ability of the pits to support the godwit population. | Moderate |
| Oystercatcher | Oystercatchers are relatively tolerant of disturbance stimuli and will habituate rapidly to ongoing activity. In undisturbed areas they will often flush at great ranges but in more disturbed locations such as a typical estuary, this figure reduces to typically between approximately 25 - 200m dependent upon the stimuli (with people causing the most extreme reaction) (Ref 1-153).<br>Collop *et al*., (Ref 1-159) recorded a minimum FID of 30m and a maximum FID of 228m (with a mean of 97m) for this species through experimentally disturbing foraging birds (approaching a total of 147 times) as part of a research study. | Moderate |

| Species | Sensitivity to noise and visual disturbance | |
|---|---|---|
| | **Evidence on the sensitivity to disturbance stimuli** | **Sensitivity level[1]** |
| | Goodship and Furness (Ref 1-160) and Goodship and Furness (Ref 1-161) undertook disturbance literature reviews and assessed Oystercatcher as being of moderate sensitivity to disturbance stimuli with the range in mean FID from the literature reviewed of 26m to 136m as a result of the presence of people on or near the foreshore with motorised vessels having a mean FID of 74m and motorised vehicles a mean FID of 106m. | |
| Teal | Bregnballe *et al.,* Ref 1-173 found most disturbance responses to this species were within 150m with limited responses at greater distances. Mayer *et al.,* (Ref 1-174) recorded a mean FID of 169 m during an experimental disturbance study. | Moderate |
| Redshank | Redshank are considered a relatively tolerant species to visual stimuli (and will often approach much closer than 100m before flushing (sometimes as close as 30-50m)) but can be sensitive to noise stimuli, They are also considered to habituate to works rapidly (Ref 1-153).<br>Collop et al., (Ref 1-159) recorded a minimum FID of 28 m and a maximum FID of 187 m (with a mean of 80m) for this species through experimentally disturbing foraging birds (approaching a total of 53 times) as part of a research study.<br>Goodship and Furness (Ref 1-161) assessed Redshank as having a moderate sensitivity to human disturbance with the range in mean FID from the literature reviewed of 4 to 150m as a result of the presence of people on or near the foreshore.<br>Goodship and Furness (Ref 1-160) undertook a disturbance literature review and assessed Redshank as being relatively sensitive to disturbance stimuli with the range in mean FID from the literature reviewed of 24m to 137m as a result of the presence of people on or near the foreshore. | Low to moderate |
| Dunlin | Dunlin appear to be a species tolerant to visual stimuli and are considered to habituate to people with most responses occurring in <75 - 100m of visual stimuli. Dunlin have been recorded foraging extremely closely to plant (<50m) and >75m from worker. When foraging, they can be initially disturbed by activity start-up, with a flight response, but will then forage back towards construction works, approaching to within 25m on occasion, before sometimes flushing and moving away again, to repeat the process (Ref 1-153). | Low |

| Species | Sensitivity to noise and visual disturbance | |
|---|---|---|
| | Evidence on the sensitivity to disturbance stimuli | Sensitivity level[1] |
| | Collop et al., (Ref 1-159) recorded a minimum FID of 9 m and a maximum FID of 194m (with a mean of 44m) for this species through experimentally disturbing foraging birds (approaching a total of 117 times) as part of a research study (Ref 1-153).<br><br>Goodship and Furness (Ref 1-160) and Goodship and Furness (Ref 1-161 undertook disturbance literature reviews with the evidence reviewed suggesting that Dunlin is less sensitive to disturbance than many other waders with the range in mean FID from the literature reviewed of 39m to 163m as a result of the presence of people on or near the foreshore. | |
| Turnstone | Turnstone are considered not very sensitive to noise stimuli and habituate rapidly, especially in conjunction with visual stimuli. They are tolerant of people/workers and plant, allowing approach as close as 30-50m before flushing. Direct observation of disturbance effects from works found Turnstone responses to be consistent with the expected high tolerance, with birds allowing approach to works to within 10m before reacting. This was in a highly disturbed area with much public use of the foreshore and of 127 potential disturbance events observed, only 19 caused reaction of which only three were caused by the works with trucks flushing Turnstones at between 15 - 100m. Walkers (and dog walkers in particular) caused the greatest reactions. There was no evidence of reactions to noise, which reached levels above 90 dB due to piling (Ref 1-153).<br><br>Collop et al., (Ref 1-159) recorded a minimum FID of 5m and a maximum FID of 75m (with a mean of 32m) for this species through experimentally disturbing foraging birds (approaching a total of 40 times) as part of a research study.<br><br>Goodship and Furness (Ref 1-160) undertook a disturbance literature review with the evidence suggesting that Turnstone is less sensitive to disturbance than many other waders with the range in mean FID from the literature reviewed of 12.5m to 39m as a result of the presence of people on or near the foreshore. | Low |
| 1. The assigned sensitivity levels have been based on available evidence with respect to responses to disturbance stimuli. For some species a range in sensitivity has been presented where evidence suggests large variations in intraspecific responses due to various factors which could influence sensitivity (such as the type of activity, site specific factors such as habituation, environmental conditions and site fidelity etc). Where information is limited a precautionary sensitivity level has been assigned. | | |

Review summary

4.10.13. Within a construction site, the level of disturbance stimuli is dependent on the type of activity being undertaken. In general, human presence on or near the foreshore (e.g., walking) is considered to cause greater disturbance than vehicles or watercraft and waterbirds are more easily disturbed by irregular movements than the regular and defined presence of machinery, vessels and other vehicles (Ref 1-152; Ref 1-151; Ref 1-175; Ref 1-176; Ref 1-177). High level responses to noise (such as dispersal away from marine works) are typically associated with sudden or irregular noise over 70-80 dB (at the receiver (i.e., bird) location not the noise source) Ref 1-155; Ref 1-162; Ref 1-14; Ref 1-154; Ref 1-153).

4.10.14. The specific responses that waterbirds will have to disturbance varies between species as well as between birds of the same species due to a range of factors including the level of habituation and environmental conditions (Ref 1-167; Ref 1-155; Ref 1-159).

4.10.15. Distances over 300 m have been recorded more occasionally for some sensitive species such as Curlew or Shelduck (Ref 1-153; Ref 1-159; Ref 1-160; Ref 1-161). However, evidence from the detailed review above suggests that waterbirds generally show a flight response to anthropogenic activities such as construction and a presence of people (such as workers) on or near the foreshore at distances of typically less than 200m (and more typically between 20m and 100m for certain species such as Turnstone or Dunlin) in areas where birds are likely to be habituated to some extent to disturbance due to existing human activity (Ref 1-154; Ref 1-148; Ref 1-155; Ref 1-156; Ref 1-157; Ref 1-143; Ref 1-153; Ref 1-158; Ref 1-161; Ref 1-159; Ref 1-160; Ref 1-151).

*Summary of effects (without mitigation)*

4.10.16. The bird data suggest that the foreshore fronting the Project (i.e. the section of Sector C between the IOT Jetty and the mudflat fronting North Beck drain within approximately 400-500m of the Project) is regularly used by a variety of feeding and roosting waterbirds as summarised in **Section 1.4 and Table A8 of Appendix A)**. In an estuary wide context, numbers of most species recorded in this area were generally low. Natural England advised that birds exceeding 1% of the estuary-wide WeBS five year mean peak is viewed as significant numbers. When compared to estuary-wide numbers, feeding Black-tailed Godwit during the winter and Turnstone (both feeding and roosting) represent up to 2% and 10% respectively of the estuary-wide WeBS five year mean peak (2017/18 to 2020/21). Counts of other species represent <1 of the estuary-wide WeBS five year mean peak. During passage and summer months, only Turnstone was present in numbers exceeding 1% of estuary wide numbers.

4.10.17. Noise stimuli caused by the vibro and percussive marine piling activity and the presence of jack-up or crane barges (causing both potential noise and visual disturbance stimuli) as well as other construction machinery, construction workers and plant activity are all potential sources of disturbance associated with construction of the approach jetty.

4.10.18. The evidence reviewed above suggests that the response of waterbirds to disturbance stimuli is typically limited at distances over 200m ( i.e. when birds are more than 200m away from disturbance stimuli) particularly in areas subject to already high levels of existing anthropogenic activity (as found in the Port of Immingham area). This detailed review has considered an extensive amount of research and reviews on FID – the distance at which a bird takes flight in response to disturbance stimuli – as well as studies that have investigated the distance that birds respond to construction activity including piling (or other analogous activities undertaken on the foreshore such as the construction of flood defence works). The use of a 200m buffer zone has been considered appropriate when considering disturbance effects for a number of assessments and research studies (such as Burton *et al.,* Ref 1-169 for waterbirds generally including sensitive species such as Shelduck and also Gill *et al.,* Ref 1-170 and Goodship and Furness (Ref 1-161) with specific respect to Black-tailed Godwit). Specifically for the Humber Estuary, Ross and Liley (Ref 1-158) stated that based on previous studies, a distance of 200m '*represents a distance well beyond the distance at which birds are likely to respond'*. This was considered applicable to both tolerant and sensitive species including Shelduck. The study also concluded that the probability of birds being flushed declined with distance (i.e. how far away the activity was from the bird), such that the probability of birds being flushed when activities are beyond 100m away is very low. The study was focused on recreational activity but also recorded disturbance associated with other activities including industry. As stated in in the review above, recreational disturbance (such as dog walking) is considered to cause greater or similar responses to that of port related disturbance.

4.10.19. The conclusions reached are supported by site specific evidence and direct observations of construction type activity occurring within the Immingham area. Recent (January to March 2023) disturbance monitoring of the IERRT Ground Investigation ("GI") works confirm that disturbance responses of waterbirds at distances of more than 200m are limited, specifically for waterbirds on the Immingham foreshore. Bird numbers and distribution on the local foreshore were also broadly comparable to what has been recorded in ongoing waterbird surveys in this area over the last five years. These birds appear to be tolerant of disturbance stimuli. A jack-up barge was used during the GI works which will also be used for the Project during construction; therefore, the construction plant will be similar in terms of visual presence. The suitability of a 200 m buffer has also been confirmed by the ornithologists who have undertaken the survey work in the Port of Immingham area which was used to inform the assessment. Their observations suggest that disturbance responses to human activity (including workers/plant on or near the foreshore, vehicles, vessels or port related noise) rarely occur when the source of disturbance is greater than 200 m from waterbirds. This includes species known to be more sensitive to disturbance such as Shelduck and Curlew. These findings are also consistent with data and observations by ABPmer ornithologists within other port environments including Southampton where waterbirds are regularly recorded within 200 m of human activity and continue feeding without eliciting any disturbance response (either dispersive or sub-dispersive) with disturbance responses typically occurring at distances of <100 m of stimuli including species considered more sensitive to disturbance such as Shelduck and Curlew.

4.10.20. With specific respect to noise stimuli, Natural England provided advice as part of the consultation for the proposed IERRT project which stated that '*peak levels below 55 dBA can be regarded as not significant, while peak noise levels approaching 70 dBA and greater are most likely to cause an adverse effect.' Therefore, levels over 65.5 dBA may cause disturbance to SPA birds. Birds may habituate to regular noise below 70 dBA, but irregular above 50 dBA should be avoided*'. It is also worth noting that visual disturbance associated with anthropogenic activity will in some situations create a disturbance effect before any associated noise starts to have an effect particularly in those species sensitive to visual stimuli (Ref 1-175; Ref 1-178; Ref 1-153).

4.10.21. On this basis the assessment has been based on consideration of a 200m potential disturbance zone and noise level guidance provided by Natural England described above.

4.10.22. The assessment focuses on potential disturbance to waterbirds on or near the foreshore due to approach jetty construction. It should be noted that construction of the Jetty Platform will occur at distances of more than 1km from the foreshore. In addition, capital dredging of the berths will also be undertaken at distances of more than 1km from the foreshore. On this basis, responses are considered unlikely even in more sensitive species on the foreshore and these elements of construction are not assessed further.

4.10.23. It is important to understand the predicted noise levels during piling and other construction activity in the context of background noise levels in the local area. Noise monitoring was undertaken between the 12 to 15 March 2024 at two locations next to the foreshore within the IGET red line boundary[27]. At both locations, noise levels greater than 65 $dB_{LAmax}$ were recorded during almost every hour of monitoring with noise also regularly exceeding 70 $dB_{LAmax}$. On several occasions, noise levels greater than 80 to 90+ $dB_{LAmax}$ were also recorded. During the noise monitoring, the dominant source of noise was operational/industrial noise associated with nearby activity at the Port of Immingham. The noise levels recorded are also broadly consistent with that recorded more widely in the Port of Immingham area. For example, noise levels of up to 84 $_{LAmax}$ were recorded at the foreshore during noise monitoring collected for the proposed 'IERRT' project (on the port land to the east and north of the Site Boundary).

4.10.24. During percussive marine piling associated with the proposed development, noise levels above 70 dB *L*max are predicted within approximately 645m of the marine piling rigs and over 80 dB *L*max within approximately 205m in the absence of noise reducing controls (**Figures 10.5** of the **ES [APP-096]**).

4.10.25. In addition, in order to better understand potential zones of disturbance, **Figure 10.6** of the **ES [APP-097]** presents a 200m buffer zone. The figures also show MLWS and MLWN so that the extent of foreshore within and outside of these buffers under different tidal states can be better understood.

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27 Attended noise measurements were collected over the 4-day period for a total of 24 hours with noise collected at intervals during the day and night.

4.10.26. Waterbirds present in the area will be habituated to some extent to anthropogenic activities (due to existing port operations) near the foreshore such as vessel and vehicle movements, port related noise and human activity. Nevertheless, avoidance responses or dispersive disturbance events (resulting in the redistribution of waterbird flocks to nearby areas) may occur during approach jetty construction on or near to the foreshore for any flocks present in this area.

4.10.27. Responses would be expected to be greatest for species considered more sensitive to bird disturbance such as Black-tailed Godwit, Redshank, Curlew and Shelduck (**Table 26**). Less sensitive species such as Dunlin and Turnstone would be expected to be disturbed to a lesser degree and feed closer to construction activity. It is known that sub-dispersive disturbance response (such as increased vigilance and corresponding reduced feeding rates or time spent roosting) can increase the stress response in birds in some situations. However, in areas such as Immingham where birds are relatively habituated to human activity, waterbirds perceive less risk associated with potential noise and visual disturbance stimuli so responses where birds stop feeding and increased stress levels are likely to be low compared to if new sources of human activity are introduced into more remote areas of coast (where birds are less habituated). It is also worth noting that sub-dispersive responses (such as increased alertness) typically have less energetic consequences per disturbance event than dispersive response (such as where birds stop feeding and take flight to another location). However, research also suggests that even when frequent dispersive flight response occur, energetic consequences and effects on overall foraging time can be limited (paragraph 4.10.12). Furthermore, there is no evidence to suggest that key SPA species occurring in the area such as Black-tailed Godwit or Turnstone are in poor condition with local Humber Estuary populations either increasing (Black-tailed Godwit) or remaining relatively stable (Turnstone), despite ongoing pressure from recreational disturbance and wildfowling along the South Bank of the Humber Estuary (Ref 1-179; Ref 1-180).

4.10.28. Should flight responses occur, it is not anticipated, however, that birds will be displaced from the local area completely, in that the birds would be expected to redistribute to nearby foreshore in the Immingham/Grimsby area and continue to feed and roost in these alternative locations following dispersal with the zone of potential disturbance very small in the context of the Humber Estuary SPA/Ramsar. The 200 buffer, for example only represents 0.023% of the SPA/Ramsar and 0.10% of intertidal foreshore habitats and specifically 0.14% of mudflat within the SPA. In addition, while energetic costs might be increased slightly due to disturbance, the research reviewed above suggests that the energetic costs of individual disturbance events would be expected to be relatively low and even relatively frequent disturbance could potentially only cause a small reduction in the time available in a day for feeding. In addition, birds are known to forage nocturnally and might potentially change foraging patterns to utilise the area during nocturnal periods when limited construction activity is occurring.

4.10.29. For all the construction activities, it is also recognised that during cold periods, coastal waterbirds are more susceptible to disturbance due to higher energetic costs and greater feeding requirements for thermoregulation. Furthermore, very cold winter weather can cause mudflats and adjacent functionally linked terrestrial habitats used for feeding (such as agricultural land and wet grassland) to freeze. In addition, cold conditions can cause an influx of waterbirds from continental Europe which have flown to Britain to escape from even colder conditions. This can further increase competition for feeding resources in an area. The increased difficulty obtaining enough food and greater energy required for thermoregulation can in some situations cause reduced survival rates and appear to make birds seem more tolerant to disturbance as birds avoid using excess energy reserves (Ref 1-141; Ref 1-181; Ref 1-182; Ref 1-159; Ref 1-166).

4.10.30. In summary, the probability of noise and visual disturbance stimuli occurring during construction is likely to be high. As described above, disturbance at a level which could cause dispersive responses and relatively localised displacement of coastal waterbirds is likely with respect to construction activity associated with approach jetty. However, the foreshore in the vicinity of the approach jetty is used by generally relatively low numbers of waterbirds. Nevertheless, the potential for an AEOI cannot be ruled out, particularly for Black-tailed Godwit. On this basis mitigation has been included.

*Mitigation*

4.10.31. In order to reduce the level of impact associated with noise and visual disturbance during construction a number of mitigation measures will be implemented. The effectiveness of these measures is described in more detail in **Appendix E** and specifically with respect to minimising the potential for AEOI on qualifying features in **Table 27**. These measures will be secured through a condition on the deemed marine licence and include the following:

a. **Winter construction restriction from 1 October to 31 March** (**approach jetty, sea wall and landside jetty ramp):** In order to minimise potential disturbance effects on wintering populations of coastal waterbirds on the foreshore it is proposed that marine construction activity associated with the approach jetty can only be undertaken at distances greater than 200m of Mean Low Water Springs during the period 1 October to 31 March inclusive which is considered a precautionary buffer based on the evidence presented above. Therefore, with the implementation of this mitigation, piling and other marine construction activity in the winter months will be at least 200 m from intertidal habitat (and typically greater distances over most tidal phases). This restriction applies until an acoustic barrier/visual screen has been installed on both sides of the semi-completed jetty structure. The restriction distance will be controlled through a digital Global Positioning System (GPS) boundary which contractors can effectively set as a spatial demarcation in which works can/cannot take place. It will then be possible to monitor compliance through reviewing the respective contractor GPS data as the works progress. Construction activity can then be undertaken on the approach jetty itself, behind the screens. The barrier/visual screen will only be required for the period 1 October to 31 March and for sections of the approach jetty within 200m of Mean Low Water Springs. With the addition of acoustic barriers, noise levels on the intertidal mudflat will be less than 70 dB(A) which is within the range of existing background noise levels of operational port activities in the Port of Immingham area. No construction activity associated with the sea wall and landside jetty ramp (including piling) will also be undertaken between the 1 October and 31 March);

b. **Noise suppression system (approach jetty):** It is proposed that a noise suppression system (consisting of a piling sleeve with noise insulating properties) is used during all percussive piling activities associated with the approach jetty (during all periods of the year) to reduce noise levels on nearby foreshore areas. The noise suppression system is predicted to reduce noise levels to <70 dB Lmax at distances greater than approximately 200m from the marine piling and also in the range of existing background noise levels of operational port activities in the Port of Immingham area;

c. **Soft starts:** Using soft starts (as outlined in the marine mammal and fish section above) will allow birds to become more tolerant to marine piling noise by allowing a more gradual increase in noise levels which will reduce the potential for birds to become startled. This will be applied to all marine piling activity; and

d. **Cold weather construction restriction**: Coastal waterbirds are considered particularly vulnerable to bird disturbance during periods of extreme winter weather[28]. On this basis, it is proposed that a temporary cessation of all construction activity within 200 m of Mean Low Water Springs is implemented following seven consecutive days of freezing (zero or sub-zero temperature) weather conditions. The restriction will not be lifted until after 24 hours of above freezing temperatures and also that Metrological Office weather forecasts indicate that freezing conditions will not return for the next five days. Similar measures have been implemented for other nearby developments and also as part of the Joint Nature Conservation Committee ("JNCC") scheme to reduce disturbance to waterfowl due to shooting activity during severe winter weather.

4.10.32. An Ecological Clerk of Works (ECoW) will be used during the overwintering period (October to March inclusive) to ensure the agreed mitigation measures for the SPA birds are adhered to and that the appropriate guidance can be provided throughout the construction works.

[28] It is recognised that during cold periods, coastal waterbirds are more susceptible to disturbance due to higher energetic costs and greater feeding requirements for thermoregulation. Furthermore, very cold winter weather can cause mudflats and adjacent functionally linked terrestrial habitats used for feeding (such as agricultural land and wet grassland) to freeze. In addition, cold conditions can also cause an influx of waterbirds from continental Europe which have flown to Britain to escape from even colder conditions in these areas. This can further increase competition for feeding resources in an area. The increased difficulty obtaining enough food and greater energy required for thermoregulation can in some situations cause reduced survival rates and appear to make birds seem more tolerant to disturbance as birds avoid using excess energy reserves (Ref 1-141; Ref 1-181, Ref 1-182; Ref 1-159; Ref 1-166).

*Assessment of the potential for an AEOI*

4.10.33. The potential disturbance effects on qualifying species of coastal waterbird during construction and the effectiveness of the proposed mitigation measures is outlined above and in **Table 27.** On the basis of this evidence the predicted residual effects are not considered to compromise any of the conservation objectives, and as a consequence, this pathway will not result in an AEOI on the qualifying interest features as the mitigation will minimise exposure to potential disturbance during the overwintering period.

**Table 27: The Potential for an AEOI on qualifying species due to potential airborne noise and visual disturbance during construction**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SPA | A048; Common Shelduck (Non-breeding) *Tadorna tadorna* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Shelduck are known to be sensitive to anthropogenic disturbance. However, only very low numbers (< 10-20 individuals, representing <1% of the estuary wide population numbers as described in Table 2) have been recorded on (or very close to [29]) the foreshore in the vicinity of the Project (i.e. within 400-500m). This is below the 1 % threshold used by Natural England to determine potentially significant numbers. Given the very low numbers of this species present feeding and roosting during the winter and outside the wintering period, potential effects on this species even without the proposed mitigation are considered to be limited in the context of local population numbers.<br><br>Without mitigation, evidence suggests that regular disturbance and avoidance responses (i.e., temporary displacement) within a zone of approximately 200m around construction activities is considered possible for the very low numbers of Shelduck likely to be present in this area. Any responses at greater distances would be expected to only occur infrequently. However, with the application of the proposed mitigation measures, disturbance responses are expected to be very limited, both in terms of frequency and the spatial extent of effects. The winter marine construction restriction from 1 October to 31 March will minimise disturbance during the colder winter months when waterbirds are considered vulnerable to the effects of disturbance. This proposed mitigation restricts all construction activity including marine piling on the foreshore and within a 200m buffer zone of Mean Low Water Springs. The noise suppression system will be used for piling undertaken outside of the 200m restriction zone. The noise suppression system is predicted |

[29] This species is typically recorded on the foreshore. Very low numbers (consisting of a few individuals) are also occasionally recorded floating on the water near the foreshore (< 50 m). These birds are loafing rather than feeding. This species is rarely recorded further offshore in this area.

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | to reduce noise levels to <70 dB *LAmax* at distances greater than approximately 200m from the marine piling. On this basis, noise levels on the foreshore during the winter construction restriction will be < 70 dB *LAmax*. This will be in the range of existing background noise levels on the foreshore (with noise levels of 65-70 + dB *LAmax* regularly occurring as a result of nearby operational port activities and other ambient noise sources). Local wintering waterbird populations are therefore subjected to noise at the level predicted to occur on the foreshore due to the piling (i.e., <70 dB *LAmax*) on a regular basis with observations from the ongoing ornithology surveys in the area recording limited responses with birds continuing to feed and roost, suggesting they are habituated to noise at these levels.<br><br>These mitigation measures are considered effective at preventing the very low numbers of Shelduck likely to be present in this area from being exposed to close range visual stimuli and loud noise above typical port background levels (which are the types of stimuli which evidence suggests are most likely to cause regular, repeated disturbance and larger responses such as dispersive flights out of the local area). Instead, birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area). On this basis, any changes to the distribution of the very low numbers of Shelduck likely to be present in this area on the foreshore is expected to be negligible and temporary with the proposed mitigation and the ‘distribution of the qualifying features within the site’ conservation objective is not considered to be compromised.<br><br>The predicted disturbance responses are not expected to cause any changes to ‘the population of each of the qualifying features’ conservation objective. This is because any disturbance or displacement during construction, with the proposed mitigation, is |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | expected to be limited (with the very low numbers of Shelduck likely to be present able to continue feed in the same areas during winter as observed prior to construction). Therefore, the predicted residual effects with the proposed mitigation in place are considered inconsequential with respect to impacts to individual energy budgets (i.e. increased energetic costs through disturbance and changes to available feeding resources or prey intake will all be negligible). On this basis, population level consequences (at both a local and fly way level) in terms of mortality or changes in breeding success will not occur. |
| | A149: Dunlin *Calidris alpina alpina* (Non-breeding) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Low numbers in the context of estuary wide populations (i.e. < 100 individuals, representing < 1% of the estuary wide numbers as described in Table 2) have been recorded on the foreshore in the vicinity of the Project (i.e. within 400-500m). This is below the 1 % threshold used by Natural England to determine potentially significant numbers. Given the very low numbers of this species present feeding and roosting during the winter and outside the wintering period, potential effects on this species even without the proposed mitigation are considered to be limited in the context of local population numbers. This species is also known to be relatively tolerant to anthropogenic disturbance. Evidence suggests this species has been observed in relatively close proximity to potential disturbance stimuli before responses are recorded (often within 50-100m or less of a disturbance sources). Nevertheless, any birds present could be susceptible to potential distance and displacement at these distances without mitigation.<br><br>However, with the application of the proposed mitigation measures, disturbance responses in the low numbers of Dunlin likely to be present in this area are expected to be very limited, both in terms of frequency and the spatial extent of effects. The winter marine construction restriction from 1 October to 31 March will minimise disturbance during the colder winter months when waterbirds are considered vulnerable to |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | the effects of disturbance on the foreshore and within a 200m buffer zone of Mean Low Water Springs. The noise suppression system will be used for piling undertaken outside of the 200 m restriction zone. The noise suppression system is predicted to reduce noise levels to <70 dB *LAmax* at distances greater than approximately 200m from the marine piling. On this basis, noise levels on the foreshore during the winter construction restriction will be < 70 dB *LAmax*. This will be in the range of existing background noise levels on the foreshore (with noise levels of 65-70+ dB *LAmax* regularly occurring as a result of nearby operational port activities and other ambient noise sources). Local wintering waterbird populations are therefore subjected to noise at the level predicted to occur on the foreshore due to the piling (i.e., <70 dB *LAmax*) on a regular basis with observations from the ongoing ornithology surveys in the area recording limited responses with birds continuing to feed and roost, suggesting they are habituated to noise at these levels.<br><br>These mitigation measures are considered effective at preventing the low numbers of Dunlin likely to be present in this area being exposed to close range visual stimuli and loud noise above typical port background levels (which are the types of stimuli which evidence suggests are most likely to cause regular, repeated disturbance and larger responses such as dispersive flights out of the local area). Instead, birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area). On this basis, any changes to the distribution of the low numbers of Dunlin likely to be present on the foreshore this area is expected to be negligible and temporary with the proposed mitigation and the '*distribution of the qualifying features within the site'* conservation objective is not considered to be compromised. |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | The predicted disturbance responses are not expected to cause any changes to '*the population of each of the qualifying features*' conservation objective. This is because any disturbance or displacement during construction, with the proposed mitigation, is expected to be limited (with the low numbers of Dunlin likely to be present able to continue feed in the same areas during winter as observed prior to construction). Therefore, the predicted residual effects with the proposed mitigation in place are considered inconsequential with respect to impacts to individual energy budgets (i.e. increased energetic costs through disturbance and changes to available feeding resources or prey intake will all be negligible). On this basis, population level consequences (at both a local and fly way level) in terms of mortality or changes in breeding success will not occur. |
| | A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Relatively low numbers in the context of estuary wide populations (i.e. < 100 individuals, representing up to 2% of the estuary wide numbers as described in Table 2) have been recorded on the foreshore in the vicinity of the Project (i.e. within 400-500m) during the winter months. However, Natural England advised that birds exceeding 1% of the estuary-wide WeBS five year mean peak is viewed as significant numbers.<br><br>This species has the potential to be sensitive to anthropogenic disturbance. Without mitigation, evidence suggests that regular disturbance and avoidance responses (i.e., temporary displacement) within a zone of approximately 200m around construction activities is considered possible for the relatively low wintering numbers of Black-tailed Godwit likely to be present in this area. Any responses at greater distances would be expected to only occur infrequently. However, with the application of the proposed mitigation measures, disturbance responses are expected to be very limited, both in terms of frequency and the spatial extent of effects. The winter marine construction restriction from 1 October to 31 March will minimise disturbance during |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | the colder winter months when waterbirds are considered vulnerable to the effects of disturbance on the foreshore and within a 200m buffer zone of Mean Low Water Springs. The noise suppression system is predicted to reduce noise levels to <70 dB *LAmax* at distances greater than approximately 200m from the marine piling. On this basis, noise levels on the foreshore during the winter construction restriction will be < 70 dB *LAmax*. This will be in the range of existing background noise levels on the foreshore (with noise levels of 65-70+ dB *LAmax* regularly occurring as a result of nearby operational port activities and other ambient noise sources). Local wintering waterbird populations are therefore subjected to noise at the level predicted to occur on the foreshore due to the piling (i.e., <70 dB *LAmax*) on a regular basis with observations from the ongoing ornithology surveys in the area recording limited responses with birds continuing to feed and roost, suggesting they are habituated to noise at these levels.<br><br>These mitigation measures are considered effective at preventing the relatively low numbers of wintering Black-tailed Godwit likely to be present in this area from being exposed to close range visual stimuli and loud noise above typical port background levels (which are the types of stimuli which evidence suggests are most likely to cause regular, repeated disturbance and larger responses such as dispersive flights out of the local area). Instead, birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area). On this basis, any changes to the distribution of the relatively low numbers of Black-tailed Godwit likely to be present on the foreshore in this area is expected to be negligible and temporary with the proposed mitigation and the '*distribution of the qualifying features within the site'* conservation objective is not considered to be compromised. |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | The predicted disturbance responses are not expected to cause any changes to '*the population of each of the qualifying features*' conservation objective. This is because any disturbance or displacement during construction, with the proposed mitigation, is expected to be limited (with the relatively low numbers of wintering Black-tailed Godwit likely to be present able to continue feed in the same areas during winter as observed prior to construction). Therefore, the predicted residual effects with the proposed mitigation in place are considered inconsequential with respect to impacts to individual energy budgets (i.e. increased energetic costs through disturbance and changes to available feeding resources or prey intake will all be negligible). On this basis, population level consequences (at both a local and fly way level) in terms of mortality or changes in breeding success will not occur. |
| | A162: Common Redshank *Tringa totanus* (Non-breeding) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Very low numbers in the context of estuary wide populations (i.e. < 10-20 individuals, representing < 1% of the estuary wide numbers as described in Table 2) have been recorded on the foreshore in the vicinity of the Project (i.e. within 400-500m). This is below the 1 % threshold used by Natural England to determine potentially significant numbers. Given the very low numbers of this species present feeding and roosting during the winter and outside the wintering period, potential effects on this species even without the proposed mitigation are considered to be limited in the context of local population numbers.<br><br>This species has the potential to be sensitive to anthropogenic disturbance. Without mitigation, evidence suggests that regular disturbance and avoidance responses (i.e., temporary displacement) within a zone of approximately 200m around construction activities is considered possible for the very low numbers of Redshank likely to be present in this area. Any responses at greater distances would be expected to only occur infrequently. However, with the application of the proposed mitigation measures, disturbance responses are expected to |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | be very limited, both in terms of frequency and the spatial extent of effects. The winter marine construction restriction from 1 October to 31 March will minimise disturbance during the colder winter months when waterbirds are considered vulnerable to the effects of disturbance. on the foreshore and within a 200m buffer zone of Mean Low Water Springs. The noise suppression system will be used for piling undertaken outside of the 200m restriction zone. The noise suppression system is predicted to reduce noise levels to <70 dB *LAmax* at distances greater than approximately 200m from the marine piling. On this basis, noise levels on the foreshore during the winter construction restriction will be < 70 dB *LAmax*. This will be in the range of existing background noise levels on the foreshore (with noise levels of 65-70+ dB *LAmax* regularly occurring as a result of nearby operational port activities and other ambient noise sources). Local wintering waterbird populations are therefore subjected to noise at the level predicted to occur on the foreshore due to the piling (i.e., <70 dB *LAmax*) on a regular basis with observations from the ongoing ornithology surveys in the area recording limited responses with birds continuing to feed and roost, suggesting they are habituated to noise at these levels.<br><br>These mitigation measures are considered effective at preventing the very low numbers of Redshank likely to be present in this area from being exposed to close range visual stimuli and loud noise above typical port background levels (which are the types of stimuli which evidence suggests are most likely to cause regular, repeated disturbance and larger responses such as dispersive flights out of the local area). Instead, birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area). On this basis, any changes to the distribution of the very low numbers of Redshank likely to be present on the foreshore in this area is expected to be negligible and temporary |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | with the proposed mitigation and the 'distribution of the qualifying features within the site' conservation objective is not considered to be compromised.<br><br>The predicted disturbance responses are not expected to cause any changes to 'the population of each of the qualifying features' conservation objective. This is because any disturbance or displacement is during construction, with the proposed mitigation, is expected to be limited (with the very low numbers of Redshank likely to be present in this area able to continue feed in the same areas during winter as observed prior to construction). Therefore, the predicted residual effects with the proposed mitigation in place are considered inconsequential with respect to impacts to individual energy budgets (i.e. increased energetic costs through disturbance and changes to available feeding resources or prey intake will all be negligible). On this basis, population level consequences (at both a local and fly way level) in terms of mortality or changes in breeding success will not occur. |
| | Waterbird assemblage | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | As well as the qualifying species above in this table, the foreshore in the vicinity of the Project also supports a range of other assemblage species. The rationale for screening in assemblage species is provided in Table 2 and **Appendix B**. On this basis, Turnstone, Teal, Oystercatcher and Curlew were the assemblage species screened into the assessment and have been recorded in the following abundances on the foreshore in the vicinity of the Project (i.e. within 400-500m) (as summarised in Section 1.4 of **Appendix A** of this HRA):<br><br>• Turnstone: <20-30 birds (representing up to 10% of the estuary wide WeBS five year mean peak);<br><br>• Teal: <20-30 birds (representing <1% of the estuary wide WeBS five year mean peak); |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | • Curlew: <10-20 birds (representing <1% of the estuary wide WeBS five year mean peak); and<br>• Oystercatcher: <10-20 birds (representing <1% of the estuary wide WeBS five year mean peak).<br><br>In summary, Teal, Oystercatcher and Curlew have only been recorded on the foreshore[30] in low numbers in the context of estuary-wide populations (and below the 1 % threshold used by Natural England to determine potentially significant numbers) but were screened in on a precautionary the basis that they regularly occur in these low numbers during winter months. However, given the very low numbers of these species present feeding and roosting during the winter (and outside the wintering period), potential effects even without the proposed mitigation are considered to be limited in the context of local population numbers. With specific respect to Turnstone, this species has been recorded in relatively large numbers (as a proportion of SPA numbers) foraging on and near the seawall in the vicinity of the Project. However, this species is considered particularly tolerant to disturbance with evidence suggesting this species has been observed in very close proximity to potential disturbance stimuli before responses are recorded (often within 30-100m or less of a disturbance sources).<br><br>However, with the application of the proposed mitigation measures, disturbance responses are expected to be very limited, both in terms of frequency and the spatial extent of effects for all assemblage species. The winter marine construction restriction from 1 October to 31 March will minimise disturbance during the colder winter months when waterbirds are considered vulnerable to the effects of disturbance on the foreshore and within a 200m buffer zone of Mean Low Water |

30 Very low numbers of Teal (<20-30 birds (representing <1% of the estuary wide WeBS five year mean peak)) are also occasionally recorded floating on the water near the foreshore (< 50 m). These birds are loafing rather than feeding. This species is rarely recorded further offshore in this area.

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | Springs. The noise suppression system will be used for piling undertaken outside of the 200m restriction zone. The noise suppression system is predicted to reduce noise levels to <70 dB *LAmax* at distances greater than approximately 200m from the marine piling. On this basis, noise levels on the foreshore during the winter construction restriction will be < 70 dB *LAmax*. This will be in the range of existing background noise levels on the foreshore (with noise levels of 65-70+ dB *LAmax* regularly occurring as a result of nearby operational port activities and other ambient noise sources). Local wintering waterbird populations are therefore subjected to noise at the level predicted to occur on the foreshore due to the piling (i.e., <70 dB *LAmax*) on a regular basis with observations from the ongoing ornithology surveys in the area recording limited responses with birds continuing to feed and roost, suggesting they are habituated to noise at these levels.<br><br>These mitigation measures are considered effective at preventing waterbirds utilising mudflat habitat in this area from being exposed to close range visual stimuli and loud noise above typical port background levels (which are the types of stimuli which evidence suggests are most likely to cause regular, repeated disturbance and larger responses such as dispersive flights out of the local area). Instead, birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area). On this basis, any changes to the distribution of birds on the foreshore is expected to be negligible and temporary with the proposed mitigation and the ‘distribution of the qualifying features within the site’ conservation objective is not considered to be compromised.<br><br>The predicted disturbance responses are not expected to cause any changes to ‘the population of each of the qualifying features’ conservation objective. This is because any disturbance or displacement during construction, with the proposed mitigation, is |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | expected to be limited (with waterbirds able to continue feed in the same areas during winter as observed prior to construction). Therefore, the predicted residual effects with the proposed mitigation in place are considered inconsequential with respect to impacts to individual energy budgets (i.e. increased energetic costs through disturbance and changes to available feeding resources or prey intake will all be negligible). On this basis, population level consequences (at both a local and fly way level) in terms of mortality or changes in breeding success will not occur. |
| Humber Estuary Ramsar site | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Summary information with respect to assemblage and individual qualifying species has been provided above in the table. |
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |

**The potential effects of airborne noise and visual disturbance during operation on qualifying species of coastal waterbird within the SPA/Ramsar boundary**

*General scientific context*

4.10.34. Operational ports, wherever located, inevitably present as a potential source of disturbance in the coastal environment. Waterbird monitoring work in the vicinity of port locations (such as the Port of Southampton, Port of Mostyn and Port of Immingham) has generally recorded limited evidence of birds on nearby intertidal habitat being disturbed through regular land side port operations with birds often becoming habituated (such as the movement of vehicles, cranes and cargo containers) (Ref 1-151; Ref 1-183). For example, Cutts (Ref 1-65) reported that most species of waterbird assemblages utilising estuarine habitats adjacent to major infrastructure (such as power stations, jetties, bridges, port facilities etc) appear to be tolerant and will both roost and forage within less than 50 m of the working infrastructure. Waterbirds have also been recorded regularly feeding under large industrial jetties as well as roosting on jetties and harbour walls.

4.10.35. Disturbance events have also been recorded as part of the ongoing IOH monitoring in the Port of Immingham area since winter 2005/06[31]. This includes any potential disturbance due to operational activities on various jetties (such as the Immingham Oil Terminal (which includes vehicle activity), Western Jetty, Eastern Jetty and Immingham Bulk Terminal). During the surveys the vast majority of the disturbance observed was caused due to either raptors (such as peregrine and sparrowhawk), recreational activities (angling or dog walking) or maintenance work on the seawall. Disturbance was also recorded on several occasions as a result of construction or maintenance work on several of the jetties. No disturbance, however, was recorded as a result of vessel movements or operational activity at or near the berths or jetties.

4.10.36. In general, human presence on the foreshore (e.g., walking) is considered to cause greater disturbance than vehicles (Ref 1-175; Ref 1-176; Ref 1-155). With specific respect to activity associated with commercial operations and works, observations from monitoring and other studies (including specifically on the Humber Estuary), suggests that disturbance responses are typically greater for personnel in the open, compared to when enclosed within a vehicle at the same distances (Ref 1-65). Waterbirds are also considered more likely to habituate to vehicle movements which occur in a more predictable manner and in a spatially limited area compared to more erratic activity (such as quad bikes on the foreshore) (Ref 1-169; Ref 1-47; Ref 1-65).

4.10.37. Disturbance events from powered vessels have been recorded within 100m of the receptor with vessels approaching at faster speeds eliciting higher disturbance. Predictability and randomness are factors of vessel traffic which can cause variation in waterbird response. Literature suggests that large commercial vessels consistently using defined routes (such as ferries or cargo ships) elicit

[31] These surveys have been undertaken twice a month from October to March (see Section 10.6 for further information on these surveys).

less of a disturbance response than recreational craft which are more unpredictable in terms of speed and course and thus their disturbance potential for birds may be enhanced (Ref 1-184; Ref 1-185; Ref 1-186; Ref 1-177). Monitoring of potential disturbance due to the movements of vessels berthing at pontoons associated with offshore windfarm Operation and Maintenance ("O&M") facilities in several port locations near to mudflats used by waterbirds recorded evidence of some mild and localised disturbance and avoidance although events were generally infrequent with larger disturbance events (causing bird to fly out of the area) only occurring more rarely. Consistent evidence of changes (reductions) in waterbird abundance in the local area which could be linked to the operational activities was not recorded (Ref 1-183; Ref 1-187).

*Summary of effects*

4.10.38. Operational disturbance stimuli could occur as a result of vessel movements associated with the Project. However, the nearest berth during spring tide periods will be located approximately 1km from intertidal mudflat used by coastal waterbirds. All SPA features screened into the Shadow HRA (Table 2) are shorebirds that occur on or very near intertidal habitats (and also associated functionally linked land) and are therefore considered to be out of the zone of influence of potential disturbance effects associated with berth vessel movements. Diving birds utilising water column habitats could be potentially exposed to disturbance associated with berth vessel movements. However, no SPA assemblage species of diving bird (such as diving ducks) were screened into the Shadow HRA (Table 2) on the basis that they are considered to be absent/only occur very rarely the vicinity of the jetty. On this basis, disturbance responses are considered highly unlikely due to vessel movements and berthing operations.

4.10.39. Disturbance could potentially occur as a result of vehicles on the approach jetty near the intertidal. The movement of vehicles will typically be restricted to periods when a vessel is berthed (i.e. 1-2 hours before vessel arrival to 1-2 hours after vessel departure) with typically up to ten return trips per day anticipated. A maximum of approximately 292 vessel callings per annum is expected to occur during operation. The majority of vehicle movements will be utility vehicles involved in transferring operations personnel, mooring line crew and vessel crew.

4.10.40. Vehicle movement will be undertaken at slow speeds (typically <12 miles per hour) and also in a predictable and consistent manner (i.e. producing the same type of visual/noise stimuli each time). Based on the evidence reviewed above, these are all attributes which support habituation and therefore are likely to limit disturbance responses. It should also be noted that many of the existing approach jetties in the Port of Immingham have some vehicular access. The IOT approach jetty in particular has regular vehicle movements with no disturbance associated with this activity recorded during the IOH bird surveys. Furthermore, pipe racks on one side of the approach jetty (which are approximately 3m in height) will likely obscure the visibility that birds on the foreshore have to moving vehicles on the approach jetty and act as screens to some extent.

4.10.41. Regarding engineering and maintenance works in Work No. 1, this activity is expected to be limited and only required occasionally.

4.10.42. The level of response that waterbirds will have to the new berth when operational will be dependent to some extent on the sensitivity they have to anthropogenic disturbance stimuli. For example, species such as Turnstone and Dunlin are typically more tolerant than Shelduck or Curlew as summarised in **Table 26**. The evidence presented above, however, suggests that birds are typically less affected by defined regular movements of people or vehicles near the shoreline (as occurs in port environments) than by random movements of people on the foreshore. Birds are regularly recorded feeding nearby or below port structures such as jetties or pontoons and appear to be relatively tolerant to normal day-to-day port operational activities.

4.10.43. It is acknowledged, however, that disturbance can occur as result of any human activity irrespective of habituation, if the activity occurs in sufficiently close proximity to a species so as to trigger a responsive reaction. Given that vessel movements will be occurring close to the foreshore on the approach jetty, intermittent disturbance responses are, therefore, still possible. This may particularly be the case at first when birds are likely to be less habituated to the new activity or as a response to a more infrequent sporadic type of activity on a structure with which birds are less familiar (such as maintenance works which are likely to be highly infrequent). Responses for most species are expected typically to involve infrequent, mild behavioural responses in a localised area in the vicinity of the approach jetty. The responses observed in birds are likely to range from increased vigilance to short flights with birds rapidly resettling and resuming feeding near their original location.

4.10.44. Based on the above, the probability of some mild and infrequent disturbance occurring is considered possible which could cause some limited (localised and temporary) displacement of coastal waterbirds around berthing infrastructure. It is expected, however, that birds will become habituated relatively quickly which will limit any longer-term disturbance responses.

*Mitigation*

4.10.45. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.10.46. The potential disturbance effects on qualifying species of coastal waterbird during operation is expected to be limited (see above and **Table 29**). On the basis of this evidence the predicted effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 28: The Potential for an AEOI on qualifying species due to potential airborne noise and visual disturbance during operation**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SPA | A048; Common Shelduck *Tadorna tadorna* (Non-breeding)<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | *Roosting birds on the intertidal*<br>As stated in paragraphs 1.4.28, Figure A7 and Table A.8 of Appendix A of the Shadow HRA, the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) is only known to typically support very low numbers of SPA species roosting. The only species known to roost in this area present in numbers above the 1% threshold (which is used by NE to determine significant numbers and as an indicator of potential for adverse effects on bird species on the Humber Estuary) is Turnstone as summarised in Table 2**.**<br>The main roosting locations for Turnstone are the upper shore boulders and sea defences in Sector C which are regularly used through the tide by individuals or small flocks of Turnstone with flocks recorded in the vicinity of the project (typically < 20 to 30 birds feeding and roosting year-round). Turnstone are considered to be very tolerant to potential disturbance (**Table 26**) and would be expected to continue using these roosting areas during operation.<br>All other SPA wader and wildfowl species including Black-tailed Godwit are only recorded roosting in very low abundances in this area (<10 birds of each species representing <1 % of estuary-wide populations, as shown in Table A.8). These species occasionally roost on upper shore habitat and sea defences. On this basis, no established roosts which are considered important even on |
| Humber Estuary Ramsar site | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage) | | |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | a local scale will be impacted as a result of potential disturbance during operation.<br>*Loafing birds near the intertidal*<br>Very low numbers of Teal and Shelduck are occasionally recorded floating on the water near the foreshore (< 50 m) in the vicinity of the project (consisting of a few individual Shelduck and <20-30 birds (representing <1% of the estuary wide WeBS five year mean peak)). These birds are loafing rather than feeding. These species are rarely recorded further offshore in this area. Potential operational effects on the very low numbers present would be anticipated to be negligible.<br>*Feeding birds on the intertidal*<br>The bird data suggests that the foreshore fronting the Project (i.e. the section of Sector C between the IOT Jetty and the mudflat fronting North Beck drain within approximately 400-500m of the Project) is regularly used by a variety of feeding waterbirds. In an estuary wide context, numbers of most SPA qualifying and assemblage species recorded in this area were generally only recorded in low numbers feeding in the intertidal during winter passage and summer periods (i.e. <10-20 birds representing <1 of the estuary-wide WeBS five year mean peak). Only feeding Black-tailed Godwit during the winter and Turnstone (in winter, passage and summer periods) were present in numbers above the 1% threshold which is used by NE to determine significant numbers as an indicator of potential for adverse effects on bird species on the Humber Estuary as summarized in Table 2**.** |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | Turnstone are considered to be particularly tolerant to potential disturbance with evidence also suggesting that Black-tailed Godwit are relatively habituated to existing port related activity and expected to show limited disturbance responses to operational movements along the jetty.<br><br>In summary, disturbance responses during operation are generally expected to be localised given the tolerance that coastal waterbirds typically show to existing port operations and the expected habituation to disturbance stimuli resulting directly from the Project. As a consequence, any change to '*the distribution of the qualifying features within the site'* conservation objective is expected to be negligible.<br><br>The predicted disturbance responses of waterbirds are considered unlikely to cause any changes to '*the population of each of the qualifying features'* conservation objective. This is because any responses are considered to be relatively limited and will not cause birds to disperse out of the Humber Estuary to another region. Furthermore, based on the magnitude of disturbance effects, population level consequences (at both a local and fly way level) in terms of mortality or changes in breeding success is considered highly unlikely. |

**The potential effects of airborne noise and visual disturbance during decommissioning on qualifying species of coastal waterbird within the SPA/Ramsar boundary**

*General scientific context*

4.10.47. Decommissioning effects are considered to be similar to those associated with construction with scientific evidence on this impact pathway is provided in Paragraphs 4.10.1 to 4.10.15.

*Summary of effects (without mitigation)*

4.10.48. No provision has been made for the decommissioning of the jetty, jetty head, jetty access ramps and the jetty access road. This is because these elements would, once constructed, become part of the fabric of the Immingham port estate and would, in simple terms, continue to be maintained so that they can be used for port-related activities to meet a long-term need. On this basis decommissioning of these elements is not considered within the Shadow HRA as no pathways exist that would cause potential effects on features of the Humber Estuary European Marine Site.

4.10.49. When appropriate, the infrastructure associated with the hydrogen production facility may be decommissioned. The majority of the proposed landside decommissioning works are well in excess of 200 m from the foreshore (located within Work Area 5). Similarly, there are no areas of terrestrial habitat within or adjacent to the Project boundary that are considered functionally linked land (and as such do not provide important habitat for SPA species). On this basis, marine ornithology receptors (i.e. coastal waterbirds) are considered to be out of the zone of potential effects associated with most decommissioning elements. The exception to this will be the removal of pipe racks within Work Area 2 (the jetty access road) and plant and equipment on the approach jetty topside associated with hydrogen production (within Work Area 1) which have been considered in the Shadow HRA (i.e. screened in at Stage 1 in Section 3).

Waterbirds present in the area will be habituated to anthropogenic activities associated with the Project such as vehicle movements, port related noise and human activity. Nevertheless, avoidance responses or dispersive disturbance events (resulting in the redistribution of waterbird flocks to nearby areas) may occur infrequently associated with decommissioning activities on the approach jetty topside or jetty access road near to the foreshore.

*Mitigation*

4.10.50. Due to the uncertainty associated with the techniques that will be used to undertake the decommissioning works within Work Areas 1 and 2, the following mitigation measure will be implemented.

a. Winter marine decommissioning restriction from 1 October to 31 March for Work Area 2 (the jetty access road) and the approach jetty topside (within Work Area 1) where the works are located within 200 m of exposed intertidal foreshore.

*Assessment of the potential for an AEOI*

*4.10.51.* The potential disturbance effects on qualifying species of coastal waterbird during decommissioning and the effectiveness of the proposed mitigation measures is outlined above and in **Table 29**. On the basis of this evidence the predicted residual effects are not considered to compromise any of the conservation objectives, and as a consequence, this pathway will not result in an AEOI on the qualifying interest features as the mitigation will minimise exposure to potential disturbance during the overwintering period.

**Table 29: The Potential for an AEOI on qualifying species due to potential airborne noise and visual disturbance during decommissioning**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SPA | A048; Common Shelduck *Tadorna tadorna* (Non-breeding) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | The decommissioning restriction from 1 October to 31 March will minimise disturbance during the colder winter months when waterbirds are considered vulnerable to the effects of disturbance and when the largest numbers of SPA species occur in the area. This proposed mitigation restricts all decommissioning activity for Work Area 2 (the jetty access road) and approach jetty topside (within Work Area 1) where the works are within a 200m zone of exposed intertidal foreshore.<br><br>With the application of the proposed mitigation measure, disturbance responses are expected to be very limited, both in terms of frequency and the spatial extent of effects for all SPA species.<br><br>On this basis, any changes to the distribution of birds on the foreshore is expected to be negligible and temporary with the proposed mitigation and the 'distribution of the qualifying features within the site' conservation objective is not considered to be compromised.<br><br>With the proposed mitigation, no changes to '*the population of each of the qualifying features'* conservation objective will also occur. |
| | A149: Dunlin *Calidris alpina alpina* (Non-breeding) | | |
| | A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding) | | |
| | A162: Common Redshank *Tringa totanus* (Non-breeding) | | |
| | Waterbird assemblage | | |
| Humber Estuary Ramsar site | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | | |
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br><br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |

## 4.11. Disturbance through Underwater Noise and Vibration

**The potential effects of underwater noise and vibration during marine piling on qualifying species of fish and marine mammals**

*General scientific context*

Underwater noise and vibration: implications for fish

4.11.1. Elevated underwater noise and vibration levels during construction activities can potentially disturb fish by causing physiological damage and/or inducing adverse behavioural reactions. A detailed underwater noise assessment has been undertaken for the Project (**Appendix 9.B [APP-187]**) and is briefly summarised in this section.

4.11.2. For most marine piling activities, the main source of noise and vibration relates to where piles are hammered or vibrated into the ground. Percussive marine piling involves hammering the pile into the seabed resulting in an impact blow and high levels of noise. Vibro marine piling produces lower levels of noise as piles are vibrated into the seabed.

4.11.3. There is a wide diversity in hearing structures in fish which leads to different auditory capabilities across species (Ref 1-188). All fish can sense the particle motion[32] component of an acoustic field via the inner ear as a result of whole-body accelerations (Ref 1-189), and noise detection ('hearing') becomes more specialised with the addition of further hearing structures. Particle motion is especially important for locating sound sources through directional hearing (Ref 1-190; Ref 1-191; Ref 1-192). Although many fish are also likely to detect sound pressure[33], particle motion is considered equally or potentially more important (Ref 1-193).

4.11.4. From the few studies of hearing capabilities in fish that have been conducted, it is evident that there are potentially substantial differences in auditory capabilities from one fish species to another (Ref 1-193). Popper *et al.* (Ref 1-190) proposed the following three categories of fish which are described below:

a. Fish with a swim bladder or air cavities that aid hearing.

b. Fish with a swim bladder that does not aid hearing.

c. Fish with no swim bladder.

4.11.5. Sea lamprey *Petromyzon marinus* and River lamprey *Lampetra fluviatilis* lack swim bladders, are sensitive only to sound particle motion and show sensitivity to only a narrow band of frequencies.

32 Particle motion is a back and forth motion of the medium in a particular direction; it is a vector quantity that can only be fully described by specifying both the magnitude and direction of the motion, as well as its magnitude, temporal, and frequency characteristics.

33 Pressure fluctuations in the medium above and below the local hydrostatic pressure; it acts in all directions and is a scalar quantity that can be described in terms of its magnitude and its temporal and frequency characteristics.

### Underwater noise and vibration: implications for grey seal and common seal

4.11.6. Marine mammals are particularly sensitive to underwater noise at higher frequencies and generally have a wider range of hearing than other marine fauna, (i.e., their hearing ability spans a larger range of frequencies). The hearing sensitivity and frequency range of marine mammals varies between different species and is dependent on their physiology.

4.11.7. The National Oceanic and Atmospheric Administration ("NOAA") (Ref 1-194) provides technical guidance for assessing the effects of underwater anthropogenic (human-made) sound on the hearing of marine mammal species. Specifically, the received levels, or acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for acute, incidental exposure to impulsive and non-impulsive underwater anthropogenic sound sources are provided. These thresholds update and replace the previously proposed criteria in Southall *et al.* (Ref 1-195) for preventing auditory/physiological injuries in marine mammals. Further recommendations have recently been published regarding marine mammal noise exposure by Southall *et al.* (Ref 1-196) which complement the NOAA (Ref 1-194) thresholds and also look at a wider range of marine mammal species.

4.11.8. The NOAA (Ref 1-194) and Southall *et al.* (Ref 1-196) thresholds are categorised according to marine mammal hearing groups. According to NOAA (Ref 1-194) grey seals and common seals are categorised as phocid pinniped (PW) (earless seals or "true seals").

4.11.9. There are no equivalent Sound Pressure Level ("SPL") behavioural response criteria that would represent the sources of underwater noise associated with the Project. Behavioural reactions to acoustic exposure are less predictable and difficult to quantify than effects of noise exposure on hearing or physiology as reactions are highly variable and context specific (Ref 1-195).

4.11.10. Few studies have documented responses of seals to underwater noise in the field (Ref 1-197). Tracking studies found reactions of the grey seals to pile driving during the construction of windfarms were diverse (Ref 1-198). These included altered surfacing or diving behaviour, and changes in swim direction including swimming away from the source, heading into shore or travelling perpendicular to the incoming sound, or coming to a halt. Also, in some cases no apparent changes in their diving behaviour or movement were observed. Of the different behavioural changes observed a decline in descent speed occurred most frequently, which suggests a transition from foraging (diving to the bottom), to more horizontal movement. These changes in behaviour were on average larger, and occurred more frequently, at smaller distances from the pile driving events, and such changes were statistically significantly different at least up to 36km from the marine piling. In addition to changes in dive behaviour, also changes in movement were recorded. There was evidence that on average grey seals within 33km were more likely to swim away from the pile driving. In some cases, seals exposed to pile-driving at close range, returned to the same area on subsequent trips. This suggests that some seals had an incentive to go to these areas, which was stronger than the deterring effect of the pile-driving.

4.11.11. A telemetry study found no overall significant displacement of common seal during construction of a wind farm in The Wash, south-east England (Ref 1-199). However, during marine piling, seal usage (abundance) was significantly reduced up to 25km from the marine piling activity; within 25km of the centre of the wind farm, there was a 19 to 83% (95% confidence intervals) decrease in usage compared to during breaks in marine piling, equating to a mean estimated displacement of 440 individuals. This amounts to significant displacement starting from predicted received levels of between 166 and 178 dB re 1 μPa (peak-peak). Displacement was limited to marine piling activity; within two hours of cessation of pile driving, seals were distributed as per the non-marine piling scenario.

4.11.12. Koschinski *et al.* (Ref 1-200) conducted a playback experiment on harbour seals in which the recorded sound of an operational wind turbine was projected via a loudspeaker, resulting in modest displacement of seals from the source (median distance was 284 vs 239 m during control trials). Two further studies of ringed seals (*Phoca hispida*), which are closely related to both harbour and grey seals, have observed behaviour in response to anthropogenic noise: Harris *et al*., (Ref 1-201) reported animals swimming away and avoidance within ~150m of a seismic survey, while Moulton *et al*., (Ref 1-202) found no discernible difference in seal densities in response to construction and drilling for an oil pipeline.

4.11.13. Another way to evaluate the responses of marine mammals and the likelihood of behavioural responses is by comparing the received sound level against species specific hearing threshold levels. Further information on the $dB_{ht}$ metric and its limitations is provided in **Appendix 9.B [APP-187].**

*Summary of effects*

Effects on fish

4.11.14. The distances at which mortality and potential mortal injury, recoverable injury, Temporary Threshold Shift ("TTS") and behavioural effects in fish are predicted to occur as a result of the percussive marine piling and vibro marine piling associated with the development are included in in **Appendix 9.B [APP-187]**.

4.11.15. The Project will involve the installation of piles of varying sizes. The highest peak noise levels are generally associated with larger-sized piles given the larger surface area of the pile in contact with the water and the larger hammer energy and/or pile driving time involved in driving them. On this project, the largest piles are up to 2.3m in diameter. However, given that only a total of two of these piles will be driven for the Project, they only represent a very small proportion of all the piles (< 1%). In addition to modelling the propagation of noise associated with these larger 2.3m diameter piles as a worst case, therefore, the propagation of noise associated with the second largest of up to 1.5m diameter piles, which comprise a more significant proportion of all the piles (45%), has also been modelled. Total number of piles will be subject to final design of the jetty which will fall within parameters set out in OCEMP and subject to a condition on the DML.

4.11.16. The predicted range (R) at which the Popper *et al.* (Ref 1-190) quantitative instantaneous peak SPL thresholds for pile driving are reached indicates that for

2.3m diameter piles, there is a risk of mortality, potential mortal injury or recoverable injury within 40 m in fish with no swim bladder (lamprey). For 1.5m diameter piles, there is a risk of mortality, potential mortal injury or recoverable injury within 10 m from the source of impact marine piling in fish with no swim bladder.

4.11.17. The calculator developed by the United States National Marine Fisheries Service ("NMFS") (Ref 1-203) as a tool for assessing the potential effects to fish exposed to elevated levels of underwater sound produced during pile driving was used to calculate the range at which the cumulative Sound Exposure Level ("SEL") thresholds for pile driving (Ref 1-190) are reached. Based on the assumptions highlighted in **Appendix 9.B [APP-187]**, for the 2.3m diameter piles, there is predicted to be a risk of mortality and potential mortal injury within 40m in fish with no swim bladder and for 1.5m diameter piles, there is predicted to be a risk within 10m. The distance at which the received level of noise is within the limits of the recoverable injury threshold in fish without a swim bladder is within 60m for the 2.3m diameter piles and within 20m for the 1.5m diameter piles.

4.11.18. For vibro marine piling of either 2.3m or 1.5m diameter piles, there is predicted to be a risk of mortality, potential mortal injury or recoverable injury within 10m in fish with no swim bladder.

4.11.19. Given the mobility of fish, any individuals that might be present within the localised areas associated with potential mortality/injury during pile driving activities would be expected to easily move away and avoid harm. Furthermore, the area local to the Project is not considered a key foraging, spawning or nursery habitat for sea lamprey or river lamprey and, therefore, this localised zone of injury is unlikely to result in effects.

4.11.20. The range at which the Popper *et al*. TTS (Ref 1-92 ) and Hawkins *et al*. (Ref 1-204) quantitative instantaneous peak SPL behaviour thresholds for percussive pile driving are reached indicates that there is a risk of a behavioural response in fish within around 2-3km from the source of impact marine piling for 2.3m diameter piles and 1-2km from the source of impact marine piling 1.5 m diameter piles. For the 2.3m diameter piles, TTS and behavioural reactions during impact marine piling are, therefore, anticipated to occur across 87% to 100% width of the Humber Estuary at low water and 59% to 88% of the width of the estuary at high water. For the 1.5m diameter piles, TTS and behavioural reactions are anticipated to occur across 43% to 87% width of the Humber Estuary at low water and 29% to 59% of the estuary width at high water. Impact marine piling, therefore, has the potential to create a partial to full temporary barrier to fish movements. For vibro marine piling, there is a risk of TTS and behavioural response in fish within around 1km from the source which equates to 43% of the width of the Humber Estuary at low water respectively and 29% of the estuary width at high water.

4.11.21. However, the scale of the behavioural response is partly dependent on the hearing sensitivity of the species. Fish without a swim bladder (e.g., river lamprey) are likely to show only very subtle changes in behaviour in this zone.

4.11.22. The scale of the behavioural effect is also dependent on the size of fish (which affects maximum swimming speed). Smaller fish, juveniles and fish larvae swim at slower speeds and are likely to move passively with the prevailing current. Larger fish are more likely to actively swim and, therefore, may be able to move out of the behavioural effects zone in less time, although it is recognised that the movement of fish is very complex and not possible to define with a high degree of certainty.

4.11.23. The effects of marine piling noise on fish also need to be considered in terms of the duration of exposure. Marine piling noise will take place over a period of approximately 343 days. However, marine piling will not take place continuously as there will be substantial periods of downtime, pile positioning and set up.

4.11.24. The piling works will be undertaken seven days per week. Intended working hours will be from 07:00 to 19:00 in certain winter months (March, September and October) and sunrise to sunset in certain summer months (June and August) which will be secured by a condition on the deemed marine licence. The maximum impact marine piling scenario is for three tubular piles to be installed each day using up to two marine piling rigs driving piles at any one time, involving approximately 270 minutes of impact marine piling per day and 60 minutes of vibro marine piling per day in a 12-hour shift. There will, therefore, be significant periods over a 24-hour period when fish will not be disturbed by any marine piling noise. The actual proportion of marine piling is estimated to be at worst around 23% over a 24 hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. In other words, any fish that remain within the predicted behavioural effects zone at the time of marine piling will not be exposed up to 77% of the time over the period of a day.

4.11.25. The marine piling will occur between 07:00 to 19:00 in certain winter months (March, September and October) and sunrise to sunset in certain summer months (June and August) (approximately 38% of impact marine piling and 8% of vibro marine piling over a 12-hour shift), which has the potential to disproportionately affect fish that migrate during daylight hours, whilst reducing the potential exposure of fish that predominantly migrate during night time hours (e.g., river lamprey).

4.11.26. It is also important to consider the noise from marine piling against existing background or ambient noise conditions. The levels of underwater noise generated by impact marine piling are predicted to reach existing background levels previously measured in the Humber Estuary within around 2 to 3km from the source. The levels of underwater noise generated by vibro marine piling are predicted to reach background levels within around 1km from the source. Furthermore, the wider local area in which the construction will take place already experiences regular vessel operations and ongoing maintenance dredging, and, therefore, fish are likely to be habituated to a certain level of anthropogenic background noise.

4.11.27. Given the uncertainty regarding the actual timing and programme for the marine piling, this assessment has been undertaken on the basis that the works could take place at any time of year as a worst case. There is the potential for marine piling to occur during the sensitive migratory periods of lamprey in the Humber Estuary. Both river and sea lamprey moving between the Humber Estuary and the sea could potentially pass near to the proposed marine works (with a risk of injury potentially occurring in very close proximity to the marine piling activity). In addition, a TTS/behavioural response (e.g., displacement) or acoustic barrier could occur over all or the majority of the width of the Humber Estuary at low water and a slightly smaller proportion of the estuary width at high water.

4.11.28. Although the effect of underwater noise and vibration from marine piling works is temporary and of short duration, there is uncertainty with respect to the timing of the works which could in the worst case scenario coincide with the migration periods of river and sea lamprey. The potential for an AEOI cannot, therefore, be ruled out and on this basis mitigation has been proposed which will be secured by a condition on the deemed marine licence.

#### Effects on grey seal and common seal (injury)

4.11.29. The distances at which permanent threshold shifts ("PTS") and TTS effects in grey seals and common seals are predicted to occur during impact marine piling and vibro marine piling for the Project are included in **Appendix 9.B [APP-187]**.

4.11.30. As discussed above for fish, the Project will involve the installation of piles of varying sizes. The largest piles that will be driven for the Project comprise two 2.3m diameter piles, which represent a very small proportion of all the piles (< 1%). In addition to modelling the propagation of noise associated with these larger 2.3m diameter piles as a worst case, therefore, the propagation of noise associated with the second largest 1.5 m diameter piles, which comprise a more significant proportion of all the piles (45%), has also been modelled.

4.11.31. There is predicted to be a risk of instantaneous PTS and TTS in seals within approximately 10 and 30m respectively from the source of the percussive (impact) marine piling of the 2.3m diameter piles and within approximately 5m and 10m respectively marine piling of the 1.5m diameter piles.

4.11.32. If the propagation of underwater noise from impact marine piling were unconstrained by any boundaries, the maximum theoretical distance at which the predicted cumulative SEL weighted levels of underwater noise during impact marine piling is within the limits of PTS and TTS in seals is approximately 2km and 10km respectively for 2.3m diameter piles, and 800m and 5km respectively for 1.5m diameter piles. The maximum theoretical distance at which the predicted cumulative SEL weighted levels of underwater noise during vibro marine piling is within the limits of PTS and TTS in seals of 80m and 1km respectively.

4.11.33. Assuming a worst case of a lower swimming speed of 1.5 m/s for all marine mammal species (including both adults and juveniles), the maximum time that would take a grey seal or common seal to leave the centre of the cumulative SEL weighted PTS and TTS injury zones during impact marine piling is estimated to be 20 minutes and two hours respectively for 2.3m diameter piles and around nine minutes and one hour respectively from 1.5m diameter piles. This is less than 9% of the time that would be required for an injury to occur and, therefore, assuming seals avoid the injury effects zone, they are not considered to be at risk of any permanent or temporary injury during impact marine piling.

4.11.34. Assuming a worst case of a lower swimming speed of 1.5 m/s for all marine mammal species (including both adults and juveniles), the maximum time that would take a grey seal or common seal to leave the centre of the cumulative SEL weighted PTS and TTS injury zones during vibro marine piling is estimated to be one minute and ten minutes respectively. This is less than 1% of the time that would be required for an injury to occur and, therefore, assuming seals evade the injury effects zone, they are not considered to be at risk of any permanent or temporary injury during vibro marine piling.

4.11.35. The results indicate that if grey or common seals present in the Humber Estuary were to remain stationary within the cumulative SEL distances from the source of marine piling over a 24 hour period, it could result in temporary and/or permanent hearing injury. However, it is considered highly unlikely that any individual seal will in fact stay within this “injury zone” during the marine piling operations.

4.11.36. Impact marine piling is predicted to have the potential to cause instantaneous injury effects within close proximity to the activity. Assuming seals avoid the cumulative SEL weighted PTS and TTS injury zone, they are not considered to be at risk of any permanent or temporary injury during piling. The potential for an AEOI cannot, however, be ruled out and on this basis mitigation has been proposed.

Effects on grey seal and common seal (disturbance)

4.11.37. Impact piling is predicted to have the potential to cause strong behavioural responses over a wider area although this will be constrained to within the outer section of the Humber Estuary between Hull and Cleethorpes.

4.11.38. Any grey or common seal present are likely to avoid the area. Behavioural responses could include movement away from a sound source, aggressive behaviour related to noise exposure (e.g., flipper slapping, abrupt directed movement), visible startle response and brief cessation of reproductive behaviour (Ref 1-195). Mild to moderate behavioural responses of any individuals within these zones could include movement away from a sound source and/or visible startle response (Ref 1-195).

4.11.39. Any evasive response could also lead to the potential temporary avoidance of the outer section of the Humber Estuary between Hull and Cleethorpes. There is therefore potential for the restriction of the movements of grey and common seal upstream and downstream (i.e., a barrier to movements). The Humber Estuary upstream of the Project is not known to be used as a breeding site for seals (with the nearest known grey seal breeding colony located over 25km away at Donna Nook at the mouth of the estuary). However, as noted in the baseline (**Section 1.3 of Appendix A**), seals are regularly recorded foraging in the Humber Estuary and have been observed within several kilometres of the Project. While numbers at any given time in the Immingham area will only represent a small proportion of regional populations[34], foraging individuals in this area are nevertheless expected to occur relatively frequently. Any barrier to movements caused by the noise during marine piling, however, would be temporary with significant periods during a 24-hour period when no marine piling will be undertaken (see below). This of itself will allow the unconstrained movements of seals through the Humber Estuary. Furthermore, as summarised in **Section 1.3 of Appendix A**, grey seals can undertake wide ranging seasonal movements over several thousand kilometres (Ref 1-205; Ref 1-19; Ref 1-199). Seals tagged at Donna Nook were recorded undertaking wide ranging movements in the outer Humber Estuary and approaches as well as more widely in the North Sea (Ref 1-199). Therefore, seals are likely to be able to exploit a much wider area for foraging during any marine piling activity.

4.11.40. The effects of marine piling noise on marine mammals also need to be considered in terms of the duration of exposure. Marine piling noise will take place over a period of approximately 343 days. Marine piling will not take place continuously as there will be periods of downtime, pile positioning and set up.

4.11.41. The marine piling works will be undertaken 07:00 to 19:00 (Monday to Sunday). At present, the maximum impact marine piling scenario is for 3 tubular piles to be installed each day using up to two marine piling rigs pile driving at any one time), involving approximately 270 minutes of impact marine piling per day and 60 minutes of vibro marine piling per day in a 12 hour shift. There will, therefore, be significant periods over a 24-hour period when marine mammals will not be disturbed by any marine piling noise. The actual proportion of marine piling is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. In other words, any marine mammals that remain within the predicted behavioural effects zone at the time of percussive marine piling will not be exposed up to 77% of the time over the period of a day.

4.11.42. It is also important to consider the noise from marine piling against existing background or ambient noise conditions. The levels of underwater noise generated by impact marine piling are predicted to reach existing background levels previously measured in the Humber Estuary within around 2 to 3km from the source. The levels of underwater noise generated by vibro marine piling are predicted to reach background levels within around 1km from the source. Furthermore, the area in which the construction will take place already experiences constant vessel operations and ongoing maintenance dredging, and, therefore, marine mammals are likely to be habituated to a certain level of anthropogenic background noise.

4.11.43. There is uncertainty with respect to the timing of the works which could in the worst case scenario result in a restriction of the movements of grey seal

[34] The Humber Estuary/Lincolnshire coast region supports thousands of grey seals with counts over 4,000-6,000 seals recorded hauling out and over 2,000 pups born in recent years at Donna Nook. In addition, counts of approximately 100-150 common seals have also been recorded at Donna Nook in recent years (**Section 1.3 of Appendix A**).

upstream and downstream (i.e., a barrier to movements). However, the behavioural effects of underwater noise and vibration from piling works would be temporary and of short duration. Seals are also highly mobile and wide ranging, and therefore are likely to be able to exploit other areas for foraging during piling. It is therefore considered that behavioural effects on seals during the piling works are unlikely to result in an AEOI.

*Mitigation*

4.11.44. In order to reduce the level of impact associated with underwater noise and vibration on fish and marine mammals during construction (which is assessed as minor to moderate adverse), the following mitigation measures will be implemented during marine piling:

a. **Soft start:** The gradual increase of marine piling power, incrementally, until full operational power is achieved will be used as part of the marine piling methodology. This will give fish and marine mammals the opportunity to move away from the area before the onset of full impact strikes. The duration of the soft start is proposed to be 20 minutes in line with the JNCC marine piling protocol [35].

b. **Vibro marine piling**: Vibro marine piling is proposed to be used where possible (which produces lower peak source noise levels than percussive marine piling) although it is recognised that impact marine piling is anticipated to always be required to reach the design depths. For the purposes of this assessment, the maximum pile driving scenario is assumed as a worst case to involve approximately 60 minutes of vibro -marine piling followed by 270 minutes of impact marine piling per day in a 12 hour shift.

c. **Seasonal marine piling restrictions**: During percussive marine piling the following further restrictions are proposed:

   i. No percussive marine piling is to take place within the waterbody between 1 April and 31 May inclusive in any calendar year. This will minimise the potential impact on the greatest number of different migratory fish in the Humber Estuary, including sea lamprey, in accordance with the periods identified in **Section 1.3 of Appendix A**, and also the more vulnerable earlier life stages of a number of migratory fish species[36]. This restriction

[35] JNCC (Ref 1-206). Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise.

[36] Spring is the peak period when Atlantic salmon and sea trout smolts migrate downstream to the sea and it is also the peak migration period for European eel elvers moving into the estuary. In addition, it is the period when allis shad move into estuaries and when sea lamprey and twaite shad gather in estuaries and move up to spawn. It is also the period when the highest densities of smelt are present in the Humber Estuary.

does not apply to percussive marine piling that can be undertaken outside the waterbody at periods of low water[37].

ii. The duration of percussive marine piling is to be actively managed within the waterbody from 1 June to 30 June and 1 August to 31 October inclusive in any year to minimise the impacts on fish migrating through Humber Estuary during this period such as silver eels, river lamprey and returning adult Atlantic salmon. Over these periods, reports detailing the total duration of piling each day are to be submitted to the MMO on a weekly basis and the Applicant will hold fortnightly meetings with the MMO (unless otherwise agreed with the MMO). A 60-minute contingency period is allowed as well as the 270 minutes per day maximum percussive pile driving scenario – this reflects 20 minutes of additional soft start procedures required for up to three piles and rigs. In the event of an abnormal situation arising which triggers the contingency period, an environmental representative for the works will be notified who will agree a plan with the contractor to limit the duration of percussive piling to 330 minutes for that day, as well as measures to prevent a future recurrence. Circumstances that trigger the contingency period will be recorded and explained in the weekly reporting to the MMO. The Applicant proposes to use the fortnightly meeting to discuss and agree further corrective action with the MMO should it be required. This piling reporting protocol does not apply to percussive marine piling that can be undertaken outside the waterbody at periods of low water. This approach has been developed in consultation with the MMO and Cefas.

d. **Night time marine piling restriction:** The upstream migration of river lamprey takes place almost exclusively at night (Ref 1-207). During the periods 1 March to 31 March, 1 June to 30 June and 1 August to 31 October inclusive, piling will be restricted at night. Specifically, no percussive or vibro piling will be undertaken from 19:00 to 07:00 in March, September and October and between sunset and sunrise in June and August. With respect to river lamprey, the restriction covering the period 1 August to 31 October will specifically benefit the nocturnal migratory periods of this species. This is based on the information provided by the Environment Agency (2013) (Ref 1-207) which states that 'in the Humber basin, river lamprey mainly enter the rivers from the estuary in autumn and then spawn in April'. The Environment Agency (Ref 1-207) report also stated that during Humber Estuary fish surveys, most river lamprey were caught in summer and autumn. Marine piling operations that have already been initiated will, however, be completed where an immediate cessation of the activity would form an unsafe working

[37] The force generated by piling outside the waterbody will be exerted on the ground at that location. The sound waves can travel outwards through the seabed or be reflected from deeper sediments. As these waves propagate, sound will also "leak" upwards contributing to the airborne sound wave. The underwater noise from piling outside the waterbody will, therefore, be considerably reduced (and negligible in scale) as a result of absorption of the sound by the ground and air, the interaction with the ground surface (reflection and scattering), and the interaction with and transmission through the ground.

practice. This restriction does not apply to marine piling that can be undertaken outside the waterbody at periods of low water;

e. **Marine Mammal Observer**: In addition, in order to further reduce the significance of the impact to marine mammals the JNCC "Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals during marine piling" (Ref 1-206) will be followed during percussive marine piling. The key procedures highlighted in this document include the following:

   i. Establishment of a 'mitigation zone' of 500m from the marine piling locations, prior to any percussive marine piling. Within this mitigation zone, observations of marine mammals will be undertaken by a trained member of the construction team using marine mammal identification resources.

   ii. 30 minutes prior to the commencement of percussive marine piling, a search will be undertaken by the Marine Mammal Observer to determine that no marine mammals are within the mitigation zone. Percussive marine piling activity will not be commenced if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual detection.

   iii. During percussive marine piling, the Marine Mammal Observer will observe the mitigation zone to determine that no marine mammals are within this area. Construction workers will be alerted if marine mammals are identified, and marine piling will cease whilst any marine mammals are within the mitigation zone. Marine piling can recommence when the marine mammal exits the mitigation zone and there is no further detection after 20 minutes.

   iv. If there is a pause in percussive marine piling operations for any reason over an agreed period of time, then another search (and soft-start procedures for marine piling) will be repeated before activity recommences. If, however, the mitigation zone has been observed while marine piling has ceased and no marine mammals have entered the zone, marine piling activity can recommence immediately.

*Assessment of the potential for an AEOI*

4.11.45. Based on outputs of the underwater noise assessment (as summarised above and in **Table 30),** including the consideration of the effectiveness of the proposed mitigation measures, the predicted residual effects are not considered to compromise any of the conservation objectives. It is therefore concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway as the mitigation will minimise exposure of lamprey and seals to potential underwater effects . The mitigation will be secured through a condition on the deemed marine licence. The potential effects of underwater noise and vibration during marine piling on qualifying species of fish and marine mammals.

**Table 30: The Potential for an AEOI on qualifying species due to potential underwater noise and vibration during marine piling**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | S1095: Sea lamprey *Petromyzon marinus* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Based on the information highlighted above, underwater noise levels during marine piling have the potential to result in potential injury/mortality in lamprey species within a relatively localised area around the marine piling activity and behavioural reactions over a larger area. However, marine piling in the most sensitive period for migrating sea lamprey will be avoided as a result of the proposed marine piling restriction mitigation with the potential for injury effects on sea lamprey, therefore, considered to be limited. On this basis, underwater noise effects on sea lamprey during marine piling is considered unlikely to causes changes to *'The populations of qualifying species'* conservation objective.<br><br>With the proposed mitigation measures in place, changes to the '*distribution of qualifying species within the site'* conservation objective is also considered unlikely as sea lamprey would be expected to continue to migrate through the estuary. |
| | S1099: River lamprey *Lampetra fluviatilis* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Based on the information highlighted above, underwater noise levels during marine piling have the potential to result in potential injury/mortality in lamprey species within a relatively localised area around the marine piling activity and behavioural reactions over a larger area. However, a seasonal restriction on marine piling at night will help minimise the potential for injury effects to river lamprey.<br><br>On this basis, underwater noise effects on river lamprey during marine piling is considered unlikely to causes changes to *'The populations of qualifying species'* conservation objective.<br><br>With the proposed mitigation measures in place, changes to the '*distribution of qualifying species within the site'* conservation objective |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | is also considered unlikely as river lamprey would be expected to continue to migrate through the estuary. |
| | S1364: Grey seal *Halichoerus grypus* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Based on the information highlighted above, underwater noise might cause some temporary changes to the movement patterns of foraging grey seals with marine piling causing avoidance responses and intermittent barrier effects during marine piling operations. Therefore, short term changes in the local distribution of grey seals could occur but no permanent changes in the overall distribution of grey seals in the region will occur. On this basis, the *'distribution of qualifying species within the site'* conservation objective will therefore not be compromised.<br>Potential injury or lethal effects to seals would be expected to be restricted to a very localised area in the direct vicinity of marine piling operations. However, with the proposed mitigation in place, the potential for injury effects on seals is considered to be limited. On this basis, underwater noise effects on grey seals during marine piling is considered unlikely to causes changes to '*The populations of qualifying species'* conservation objective. |
| Humber Estuary Ramsar site | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Summary information with respect to the grey seal feature has been provided above in the table. |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Summary information with respect to lamprey features has been provided above in the table. |
| The Wash and North Norfolk Coast | 1365: Harbour seal *Phoca vitulina* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | It is acknowledged that there could potentially be connectivity between the Wash and North Norfolk Coast SAC and the Humber Estuary with respect to common seal movements. Common seals have been recorded foraging over 200km from haul out sites outs including from sites in the Wash (Ref 1-15; Ref 1-16; Ref 1-17). The Wash and North Norfolk Coast SAC is located over 75km from the Project. However, evidence suggest that harbour seals typically forage within 40-50km of their haul out sites (Ref 1-18) which is reflected high predicted at-sea densities of common seals in the Wash and along the North Norfolk and Lincolnshire coasts and much lower predicted densities in the Humber Estuary or north of Spurn Point (Ref 1-19). On this basis, the Immingham area is not considered to be key foraging habitat for common seals of the Wash and North Norfolk Coast SAC population although it is acknowledged that it's possible that individuals from this population could infrequently forage in this area.<br>Based on the information highlighted above, any potential behavioural zone of influence associated with underwater noise will not be in an area considered part of the core range of common seals of the Wash and North Norfolk Coast SAC population and the '*distribution of qualifying species within the site'* conservation objective will therefore not be compromised. Potential injury or lethal effects to seals would be expected to be restricted to a very localised area in the direct vicinity |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | | | of marine piling operations. However, with the proposed mitigation in place, the potential for injury effects on seals is considered to be limited. On this basis, underwater noise effects on grey seals during marine piling is considered unlikely to causes changes to *'The populations of qualifying specie*s' conservation objective. |

**The potential effects of underwater noise and vibration during capital dredge and dredge disposal on qualifying species of fish and marine mammals**

*General scientific context*

4.11.46. Elevated underwater noise and vibration levels during construction activities can potentially disturb fish and marine mammals by causing physiological damage and/or inducing adverse behavioural reactions. A detailed underwater noise assessment has been undertaken for the Project (**Appendix 9.B [APP-187]**) and is briefly summarised in this section.

4.11.47. Scientific evidence on this impact pathway is provided in Paragraphs 4.11.3 to 4.11.5 in relation to lamprey and in Paragraphs 4.11.6 to 4.11.13 in relation to marine mammals (grey seal).

4.11.48. The dredging process involves a variety of sound generating activities which can be broadly divided into sediment excavation, transport and placement of the dredged material at the disposal site (Ref 1-208; Ref 1-209; Ref 1-210). For most dredging activities, the main source of sound relates to the vessel engine noise.

*Summary of effects*

Effects on fish

4.11.49. The relative distances at which mortality and potential mortal injury, recoverable injury, TTS and behavioural effects in fish are predicted to occur as a result of the dredging and vessel movements associated with the development are included in in **Appendix 9.B [APP-187]**.

4.11.50. The qualitative guidelines for continuous noise sources (Ref 1-190) consider that the risk of mortality and potential mortal injury in all fish is low in the near, intermediate and far-field. Applying the cumulative SEL thresholds for marine piling (Ref 1-190) on a precautionary basis, indicate that there is a risk of mortality/ potential mortal injury within 10 m in fish with no swim bladder (i.e. lampreys).

4.11.51. According to Popper *et al.* (Ref 1-190), the risk of recoverable injury is considered lower for fish with no swim bladder (lamprey) compared to fish where the swim bladder is involved in hearing (e.g., herring). For the latter group whereby a cumulative noise exposure threshold is recommended (170 dB rms for 48 h), the distance at which recoverable injury is predicted as a result of the dredging and vessel movements is 10 m, and therefore the distance to recoverable injury in lamprey is assumed to be less than 10 m. Applying the cumulative SEL thresholds for marine piling (Ref 1-190) on a precautionary basis, indicate that there is a risk of recoverable injury within 20 m for fish with no swim bladder.

4.11.52. Popper *et al*. (Ref 1-190) advise that there is a moderate risk of a TTS occurring in the nearfield (i.e., tens of metres from the source) in fish with no swim bladder (lamprey) and a low risk in the intermediate and far-field. There is a greater risk of TTS in fish where the swim bladder is involved in hearing (e.g., herring) when a guideline quantitative threshold is recommended (158 dB rms for 12 h). The distance at which TTS is predicted in these fish as a result of the dredging and vessel movements is 50m, and therefore the distance to TTS in lamprey is assumed to be less than 50m. Applying the cumulative SEL thresholds for marine piling on a precautionary basis, indicate that there is a risk of TTS occurring within 700m in all fish.

4.11.53. Popper *et al.* (Ref 1-190) guidelines suggest that there is considered to be a moderate risk of potential behavioural responses occurring in the nearfield (i.e., tens of metres from the source) for fish species with no swim bladder (lamprey). At intermediate distances (i.e., hundreds of metres from the source), there is considered to be a moderate risk of potential behavioural responses in all fish and in the farfield (i.e., thousands of metres from the source) there is considered to be a low risk of a response in all fish.

4.11.54. Overall, there is generally considered to be a low risk of any injury in lamprey as a result of the underwater noise generated by dredging and vessel movements although mortality/potential mortal injury or recoverable injury could potentially occur in very close proximity to the dredger. The level of exposure will depend on the position of the fish with respect to the source, the propagation conditions, and the individual's behaviour over time. However, it is unlikely that a fish would remain in the vicinity of a dredger for extended periods within the distances at which mortality/potential mortal injury or recoverable injury are predicted in lamprey as a result of the dredging and vessel movements, as explained in **Paragraph 4.11.52**. TTS and behavioural responses are anticipated to be relatively localised in scale, in the context of the estuary width and the unconstrained nature of the location, and lamprey will be able to move away and avoid the source of the noise as required. Furthermore, the period of capital dredging during construction will be very short term and temporary, lasting a period of approximately 12 days in total. Based on the above considerations, the effect of underwater noise on river and sea lamprey due to dredging and disposal activities is considered to be relatively minor.

#### Effects on grey seal and common seal

4.11.55. The distances at which PTS and TTS and behavioural effects in marine mammals that occur in the study area are predicted to occur as a result of the dredging and vessel movements to and from the disposal sites associated with the Project are included in **Appendix 9.B [APP-187]**.

4.11.56. NOAA's user spreadsheet tool (Ref 1-211) has been used to predict the range at which the weighted cumulative SEL acoustic thresholds (Ref 1-194) for PTS and TTS are reached during the proposed dredging and disposal activity based on the assumptions highlighted in in **Appendix 9.B [APP-187]**.

4.11.57. There is predicted to be no risk of PTS in seals and the risk of TTS is limited to within 10 m from the dredging or vessel activity.

4.11.58. Overall, there is not considered to be any risk of injury or significant disturbance to grey seal or common seal from the dredging and vessel activities that are proposed at the Port of Immingham even if the dredging and vessel movements were to take place continuously 24/7. Furthermore, the period of capital dredging during construction will be very short term and temporary, lasting a period of around 12 days in total.

4.11.59. Hearing damage is unlikely to occur and the main effect that could be expected in the vicinity of the dredge vessels would be short-term mild behavioural avoidance. Based on these factors, the effect of underwater noise on grey seal or common seal due to dredging and disposal activities is considered to be negligible.

*Mitigation*

4.11.60. Mitigation is not required for this impact pathway.

*Assessment of the potential for an AEOI*

4.11.61. Based on outputs of the underwater noise assessment (as summarised above and in **Table 31),** the predicted effects from this pathway are not considered to compromise any of the conservation objectives. It is therefore concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 31: The potential for an AEOI on qualifying species due to potential underwater noise and vibration during dredging**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | S1095: Sea lamprey *Petromyzon marinus*<br><br>S1099: River lamprey *Lampetra fluviatilis* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | The risk of injury to fish as result of dredging noise is considered to be very low. Behavioural responses are only predicted in a highly localised area near to the dredging vessel with lamprey able to easily move away and avoid the source of noise. The capital dredging noise will therefore not affect the migratory movements of lamprey or causes changes to '*The populations of qualifying species'* or the '*distribution of qualifying species within the site'* conservation objectives. |
| | S1364: Grey seal *Halichoerus grypus* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | The risk of injury to grey seal as a result of dredging noise is considered very low. Behavioural responses are only predicted in a highly localised area near to the dredging vessel with grey seals able to easily move away and avoid the source of noise. The capital dredging noise will, therefore, not causes changes to 'The populations of qualifying species' or the 'distribution of qualifying species within the site' conservation objectives. |
| The Wash and North Norfolk Coast | S1365 Harbour seal *Phoca vitulina* | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | The risk of injury to common seal as a result of dredging noise is considered very low. Behavioural responses are only predicted in a highly localised area near to the dredging vessel with grey seals able to easily move away and avoid the source of noise. The capital dredging noise will, therefore, not causes changes to 'The populations of qualifying species' or the 'distribution of qualifying species within the site' conservation objectives. |
| Humber Estuary Ramsar site | Criterion 3 – supports populations of plants and/or animal species of international importance:<br><br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Summary information with respect to the grey seal feature has been provided above in the table. |

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| | Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | | |
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | Summary information with respect to lamprey features has been provided above in the table. |

## 4.12. Biological Disturbance due to Potential Introduction and Spread of Non-native Species

**The potential effects of the introduction and spread of non-native species during construction on qualifying habitats**

*General scientific context*

4.12.1. Non-native, or invasive, species are described as 'organisms introduced into places outside of their natural range of distribution, where they become established and disperse, generating a negative impact on the local ecosystem and species' (International Union for Conservation of Nature (Ref 1-212). The ecological impacts of such 'biological invasions' are considered to be the second largest threat to biodiversity worldwide, after habitat loss and destruction. In the last few decades marine and freshwater systems have been impacted by invasive species, largely as a result of increased global shipping (Ref 1-213).

4.12.2. The introduction and spread of non-native species can occur either accidentally or by intentional movement of species as a consequence of human activity (Ref 1-214 cited in Ref 1-215). The main pathway for the potential introduction of non-native species is via fouling of vessels' hulls, transport of species in ballast or bilge water and the accidental imports from materials brought into the system during development activities. Pathways involving vessel movements (fouling of hulls and ballast water) have been identified as the highest potential risk routes for the introduction of non-native species (Ref 1-216; Ref 1-215), particularly from different biogeographical regions, which agrees with the fact that areas with a high volume of shipping traffic are hotspots for non-native species in British waters (Ref 1-215).

4.12.3. The fouling of a vessel hull and other below-water surfaces can be reduced through the use of protective coatings. These coatings usually contain a toxic chemical (such as copper) or an irritant (such as pepper) that discourages organisms from attaching. Other coatings, such as those that are silicone-based, provide a surface that is more difficult to adhere to firmly, making cleaning of the hull less laborious. The type and concentration of coatings that can be applied to a boat hull is regulated and can vary between countries. Maintenance of hulls through regular cleaning will minimise the number of fouling organisms present. Hull cleaning can take place on land or in-water. In both cases, care needs to be taken to prevent the organisms and coating particles from being released into the water. By following best management practices, the impact of the cleaning procedure on the environment can be minimised.

4.12.4. Non-native invasive species also have the potential to be transported via ship ballast water. Seawater may be drawn into tanks when the ship is not carrying cargo, for stability, and expelled when it is no longer required. This provides a vector whereby organisms may be transported long distances. In 2004, the International Maritime Organisation ("IMO") adopted the 'International Convention for the Control and Management of Ships' Ballast Water and Sediments', which introduced two performance standards seeking to limit the risk of non-native invasive species being imported (including distances for ballast water exchange and standards for ballast water treatment). The Convention came into force internationally in September 2017.

4.12.5. The UK is bound by international agreements such as the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979), the Convention on the Conservation of European Wildlife and Natural Habitat (Berne Convention, 1979) and the Habitats and Birds Directives. All of these include provisions requiring measures to prevent the introduction of, or control of, non-native species, especially those that threaten native or protected species (Ref 1-217). Additionally, Section 14(1) of the Wildlife and Countryside Act ("WCA") (Ref 1-218) makes it illegal to release, or allow to escape into the wild, any animal which is not ordinarily resident in Great Britain and is not a regular visitor to Great Britain in a wild state or is listed in Schedule 9 to the WCA.

*Summary of effects*

4.12.6. As discussed above, non-native species have the potential to be transported into the study area on ships' hulls during capital dredging and construction activity (such as crane barges used in marine piling). Non-native invasive species also have the potential to be transported via ship ballast water. Seawater may be drawn into the dredger tanks or hopper when the ship is not carrying cargo, for stability, and expelled when it is no longer required. This provides a vector whereby organisms may be transported long distances.

**4.12.7.** Within England and Wales, best practice guidance has been developed on how to manage marine biosecurity risks at sites and when undertaking activities through the preparation and implementation of biosecurity plans (Ref 1-219). This guidance will be followed when developing biosecurity control measures to minimise the risk of the introduction and spread of non-native species during construction of the scheme. These measures will be included within the **Construction Environmental Management Plan ("CEMP") [~~REP3-026~~REP4-008]**. On this basis, the probability of the introduction and spread of non-native species from the construction phase is considered to be low.

*Mitigation*

4.12.8. No additional mitigation has been identified in relation to this pathway, however the assessment is based on the application of standard best practice measures in the form of robust biosecurity management procedures.

4.12.9. Biosecurity control measures during construction will be included within the CEMP [~~REP3-026~~REP4-008].

Field Code Changed

*Assessment of the potential for an AEOI*

4.12.10. Based on the proposed biosecurity measures, the probability of the introduction and spread of non-native species from the construction phase is considered to be low (see above and **Table 32**). The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 32: The potential for an AEOI on qualifying habitats due to the potential introduction and spread of non-native species during construction**

| Site | Features | Potential AEOI | Justification |
| --- | --- | --- | --- |
| Humber Estuary SAC | H1110: Sandbanks which are slightly covered by sea water all the time | In the context of the site's conservation objectives, there is no potential AEOI on qualifying interest features. | Taking into account the considerations highlighted above and the proposed biosecurity measures, the probability of the introduction and spread of non-native species from the construction phase is considered to be low. On this basis, this pathway is not expected to cause a change to the '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species'* conservation objective. This pathway will also not cause any changes to the '*the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely*' conservation objectives. |
| | H1130: Estuaries | | |
| | H1140: Mudflats and sandflats not covered by seawater at low tide | | |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | |

**The potential effects of the introduction and spread of non-native species during operation on qualifying habitats**

*General scientific context*

4.12.11. Scientific evidence on this impact pathway is provided in Paragraphs 4.12.1 to 4.12.5.

*Summary of effects*

4.12.12. Non-native species have the potential to be transported into the study area on ships' hulls during maintenance dredging and through operational vessels. Non-native invasive species also have the potential to be transported via ship ballast water. Seawater may be drawn into tanks when the ship is not carrying cargo, for stability, and expelled when it is no longer required. This provides a vector whereby organisms may be transported long distances. Non-native species may negatively affect native species and alter habitats due to direct interactions like predation and competition as well as spreading disease to and between native species.

4.12.13. Piles and other artificial structures can provide suitable habitats for non-indigenous marine species and function as corridors for the expansion of these species in terms of range and distribution. However, artificial structures are widespread in the Immingham area with a wide variety of jetty structures, sea walls and sea defences available for species to colonise. On this basis, the presence of new infrastructure as a result of the Project is considered unlikely to significantly increase the rate of spread of non-native species in the area.

4.12.14. In view of current legislation (described in **Paragraph 4.12.5**) and the fact that potential biosecurity risks are managed through ABP's existing biosecurity management procedures, the probability of the introduction and spread of non-native species from operational phase is considered to be low.

*Mitigation*

4.12.15. No additional mitigation has been identified in relation to this pathway, however there is a requirement to ensure the application of standard best practice measures in the form of robust biosecurity management procedures.

4.12.16. ABP’s existing biosecurity management procedures will be followed during operation.

*Assessment of the potential for an AEOI*

4.12.17. Based on the proposed biosecurity measures, the probability of the introduction and spread of non-native species from the operational phase is considered to be low (see above and **Table 33**). The predicted effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 33: The potential for an AEOI on qualifying habitats due to the potential introduction and spread of non-native species during operation**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SAC | H1110: Sandbanks which are slightly covered by sea water all the time | In the context of the site's conservation objectives, there is no potential AEOI on qualifying interest features. | Taking into account the considerations highlighted above and the proposed biosecurity measures, the probability of the introduction and spread of non-native species from the operational phase is considered to be low. On this basis, this pathway is not expected to cause a change to the '*the extent and distribution of qualifying natural habitats and habitats of the qualifying species'* conservation objective. This pathway will also not cause any changes to the '*the structure and function of qualifying natural habitats'* or cause modifications to '*the supporting processes on which qualifying natural habitats rely*' conservation objectives. |
| | H1130: Estuaries | | |
| | H1140: Mudflats and sandflats not covered by seawater at low tide | | |
| Humber Estuary Ramsar site | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest features. | |

## 4.13. Changes to foraging and behaviour due to artificial lighting

**Lighting effects on coastal waterbirds during construction**

*General scientific context*

4.13.1. Waders and other waterbirds feeding on intertidal mudflats are known to feed nocturnally. Evidence suggests that artificial illumination can improve foraging (through increasing prey intake rate) and, therefore, lighting can have a positive effect on the nocturnal foraging of waterbirds (Ref 1-39). Artificial lighting has also been found in some situations to increase potential perceived predation risk in waders which can cause increased behavioural responses in areas with higher intensity illumination (Ref 1-40).

*Summary of effects*

4.13.2. The majority of construction activities are planned to occur in daylight hours. Where construction is required at night on the approach jetty, effects in terms of changes to coastal waterbird foraging activity and behaviour will be localised.

*Mitigation*

4.13.3. As part of standard best practice that has been embedded into the Project, temporary lighting during construction will be arranged so that glare is minimised outside the construction areas. A Lighting Management Plan ("LMP") will be incorporated into the Final CEMP that addresses the use of lighting around potentially sensitive areas including the Humber Estuary.

*Assessment of the potential for an AEOI*

4.13.4. Potential effects are predicted to be highly localised and of negligible magnitude. The predicted effects are therefore not considered to compromise any of the conservation objectives (**Table 34**), and it is concluded that there is no potential for AEOI on qualifying interest features as a result of this pathway.

**Table 34: The potential for an AEOI on qualifying species due to lighting effects on coastal waterbirds during construction**

| Site | Features | Potential AEOI | Justification |
|---|---|---|---|
| Humber Estuary SPA | A048; Common Shelduck *Tadorna tadorna* (Non-breeding) | In the context of the site's conservation objectives, there is considered to be no potential AEOI on the qualifying interest feature. | Any changes to the distribution of birds on the foreshore is expected to be negligible and temporary and the '*distribution of the qualifying features within the site*' conservation objective is not considered to be compromised.<br>No changes to '*the population of each of the qualifying features*' conservation objective will also occur. |
| | A149: Dunlin *Calidris alpina alpina* (Non-breeding) | | |
| | A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding) | | |
| | A162: Common Redshank *Tringa totanus* (Non-breeding) | | |
| | Waterbird assemblage | | |
| Humber Estuary Ramsar site | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl – 153,934 waterfowl (five year peak mean 1998/99–2002/3) | | |
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |

## 4.14. Consideration of Combined Effects

4.14.1. The potential impact pathways have also been considered collectively. The assessment of intra-project effects involves the consideration of where two or more different types of effect arising from the Project could interact or combine to influence the same qualifying interest feature and whether this combined effect could potentially undermine the conservation objectives of the European Site.

4.14.2. Potential intra-project effects were identified for the features of the Humber Estuary SAC, SPA and Ramsar considering all impact pathways screened into the assessment (see **Section 4.2**). The following potential effects which could interact or combine were identified:

a. During construction there are potential combined effects on Humber Estuary SAC habitats (sandbanks which are slightly covered by sea water all the time; estuaries; and mudflats and sandflats not covered by seawater at low tide) from habitat loss, damage, contamination and biological disturbance.

b. During operation there are potential combined effects on Humber Estuary SAC habitats from habitat loss/damage and biological disturbance.

c. During construction there are potential combined effects on Humber Estuary SAC species sea lamprey and river lamprey from contamination and disturbance through underwater noise and vibration.

d. During construction there are potential combined effects on features of the Humber Estuary SPA (Common Shelduck, Dunlin, Black-tailed Godwit, Common Redshank and the waterbird assemblage) from habitat loss/damage and airborne noise and visual disturbance.

4.14.3. Multiple impact pathways were similarly identified for the Humber Estuary Ramsar with potential effects relating to the following:

a. Criterion 1: Habitat loss/damage, contamination and disturbance during construction and habitat loss/damage and disturbance during operation.

b. Criterion 5 and Criterion 6: Habitat loss/damage and disturbance in both construction and operation.

c. Criterion 8: Contamination and disturbance during construction[38].

4.14.4. The combined intra-project effects of all impact pathways have been considered in relation to each feature and in the context of the sites' conservation objectives. The majority of effects are small scale and are assessed as negligible/*de minimis* magnitude and it is concluded that there are no intra-project effects that would result in an AEOI of the Humber SAC, SPA or Ramsar.

4.14.5. It is noted that for two instances there is a reliance on mitigation measures to enable a conclusion of no AEOI to be reached. This relates to mitigation measures that are required during construction to minimise the effects due to

[38] JNCC (Ref 1-220). Information Sheet on Ramsar Wetlands - Humber Estuary. Available at: https://jncc.gov.uk/jncc-assets/RIS/UK11031.pdf (accessed 2 January 2023).

airborne noise and visual disturbance and from underwater noise and vibration which are discussed in more detail below.

4.14.6. During construction, coastal waterbirds which are features of the Humber Estuary SPA (Common Shelduck, Dunlin, Black-tailed Godwit, Common Redshank and the waterbird assemblage) will be subject to effects from airborne noise and visual disturbance as well as loss of intertidal mudflat which is a feeding resource. In theory these effects could combine to result in a synergistic effect if birds which are displaced as a result of noise are also limited by the availability of food resource. However, in reality the direct loss of a very small area of intertidal mudflat (0.0021 ha) and the indirect loss from alterations to physical processes (0.04 ha) are within the scale of natural variability and is expected to be immeasurable in real terms when taking account of the variation in water levels, wave climate and accuracy of the modelled bathymetry. The combined loss of intertidal mudflat is considered inconsequential to these mobile coastal waterbird species even at a local scale (see **Section 4.3**). Based on the evidence provided in **Section 4.10** in relation to airborne noise and visual disturbance during construction and with reference to the mitigation measures, the predicted combined effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features of the Humber Estuary SPA.

4.14.7. There is also the potential for combined effects of marine and landside piling to cause potential noise disturbance to coastal waterbirds. However, terrestrial noise modelling has predicted that the nearest landside piling to the foreshore (within Work Area No. 5. associated with piling of the foundations of the ammonia storage tanks) is predicted to cause noise levels <55 dB $L_{Aeq,1hr}$ and <65 dB $L_{Amax}$ on the foreshore. This is lower than the 70 dB criteria applied in the assessment and also in the range of background noise in the local Port of Immingham area. The terrestrial piling is also more than 300 m from the foreshore (which is greater than the 200 m disturbance buffer applied in the assessment). On this basis, SPA waterbird features on the foreshore are predicted to be out of the zone of potential disturbance effects arising from terrestrial piling noise during construction. Correspondingly, combined effects resulting from terrestrial and marine piling will be negligible and not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features of the Humber Estuary SPA.

4.14.8. During construction there are potential combined effects on Humber Estuary SAC species sea lamprey and river lamprey from contamination and disturbance through underwater noise and vibration. There are no anticipated effects on fish from toxic and non-toxic contamination pathways. Based on modelling the sediment plumes resulting from dredging will be localised and will dissipate relatively rapidly and be immeasurable against background levels within a short duration of time (less than a single tidal cycle. There are generally low levels of contamination in the sediment contamination samples and elevations in the concentrations of contaminants within the water column are not anticipated. Based on the evidence provided in **Section 4.11** in relation to disturbance from underwater noise and vibration during construction and with reference to the mitigation measures, the predicted combined effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features of the Humber Estuary SAC.

## 4.15. In-combination Assessment

4.15.1. The Habitats Regulations require an assessment of the potential in-combination effects of the proposed works on European/Ramsar sites with other plans and projects. These refer to effects, which may or may not interact with each other, but which could affect the same interest feature.

4.15.2. Potential in-combination effects on interest features of European/Ramsar sites that have been screened into the AA (see **Section 3**) have been considered in this section.

4.15.3. Proposed plans or projects in the Humber Estuary which have the potential to cause potential cumulative/in-combination effects with marine ecology and ornithology features are discussed in more detail in the cumulative and in-combination effects assessment (**Chapter 25: Cumulative and In-Combination Effects [APP-067]**. Those plans or projects which overlap with the zone of influence of potential effects on marine ecology receptors as a result of the Project and are assessed in **Chapter 25: Cumulative and In-Combination Effects [APP-067]** have been taken forward for this Shadow HRA in-combination assessment. The details of each short-listed application including a description of the project, the application and approval status and project timescales are provided in **Table 25.5** in **Chapter 25: Cumulative and In-Combination Effects [APP-067]**. The projects and pathways screened into the in-combination assessment (i.e. have the potential for LSE) are detailed in **Table 35.**

4.15.4. Potential in-combination effects are then considered in detail in **Table 36** (Humber Estuary SAC and the Wash and North Norfolk Coast SAC), **Table 37** (Humber Estuary SPA) and **Table 38** (Humber Estuary Ramsar) in the context of the sites' conservation objectives. This includes consideration of all projects combined taking into account the residual effects resulting from all projects once the respective mitigation measures have been implemented.

4.15.5. In summary, none of the ongoing activities, plans and projects are anticipated to result in in-combination effects of a scale that would change the existing condition status of the interest features recognised within the European/Ramsar sites screened into the AA. On this basis, the Project is considered to result in no potential for an AEOI on any interest features of European/Ramsar sites in-combination with other plans, projects and activities.

**Table 35: Identification of projects and impact pathways screened into the in-combination assessment.**

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| 9 | DM/0865/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound – Site 4 | Approx. 0.5km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 10 | DM/0864/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound - Site 3 | Approx. 0.5km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 13 | DM/0628/18/FUL (includes variation of conditions DM/0274/20/FUL)<br>Partially demolish existing building and erect 20MWE waste to energy power generation facility, 65m stack and associated plant, machinery | Approx. 0.5km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 16 | DM/0862/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound - Site 1 | Approx. 0.4km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 17 | DM/0863/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound - Site 2 | Approx. 0.4km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 18 | DM/0026/18/FUL<br>Erect an Energy Recovery Facility with an electricity export capacity of up to 49.5MW | Approx. 0.1km south | **Habitat loss/damage** |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| | and associated infrastructure including a stack to 90m high | | • Physical change to habitats resulting from the deposition of airborne pollutants |
| 21 | EN010107<br>South Humber Bank Energy Centre | Approx. 2.1km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 35 | DM/0329/18/FUL<br>Erection of industrial building and adjoined two storey office/control room to create power plant (18MW Energy From Waste) | Approx. 5km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 37 | DM/1070/18/FUL<br>Construction of an energy from waste facility of up to 49.9MWe gross capacity including emissions stack(s) and associated infrastructure | Approx. 3km south | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 95 | PA/2018/918<br>Planning permission to construct a new gas-fired power station with a gross electrical output of up to 49.9 megawatts. A further non-material amendment application has been made (PA/2021/1039) | Approximately 3.7km | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 116 | DM/0664/19/FUL<br>Velocys Waste to Fuel Plant, off Moody Lane - Development of a sustainable | Approx. 2km | **Habitat loss/damage** |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| | transport fuels facility, including various stacks up to 80m high, creation of new accesses, installation of pipelines, rail link, associated infrastructure and ancillary works | | • Physical change to habitats resulting from the deposition of airborne pollutants |
| 117 | PA/SCO/2022/7<br>Station Road South Killingholme, works on land to the east of Rosper Road, Killingholme | Approx 4.5km | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 115. | MLA/2014/00431/4<br>Maintenance dredge disposal at Grimsby, Immingham and Sunk Dredged Channel | Approx. 0.1km | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| | | | **Disturbance**<br>• Disturbance through underwater noise and vibration<br>• Airborne noise and visual disturbance |
| 94. | MLA/2020/00520<br>Humber International Terminal (HIT) berth 2: adaptation for car carriers | Approx. 2.6km | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>• Disturbance through underwater noise and vibration<br>• Airborne noise and visual disturbance |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| 25. | TR030001, TR030005 and TR030006<br>Able Marine Energy Park including Material Changes 1 and 2 | 4.10km north of the Site | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>• Disturbance through underwater noise and vibration<br>• Airborne noise and visual disturbance |
| 28. | EN070006<br>Humber Low Carbon Pipelines | 6.41km north West of the Site | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| | | | • Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>• Disturbance through underwater noise and vibration<br>• Airborne noise and visual disturbance |
| 29. | EN070008<br>Viking CCS Pipeline | 2km south of the Site | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>• Disturbance through underwater noise and vibration<br>Airborne noise and visual disturbance |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| 22. | Immingham Eastern Ro-Ro Terminal (IERRT) | Approx. 0.1km | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>• Disturbance through underwater noise and vibration<br>• Airborne noise and visual disturbance |
| 27. | North Killingholme Power Project | 6.38km north West of the Site | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| | | | • Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>• Disturbance through underwater noise and vibration<br>• Airborne noise and visual disturbance |
| 102. | DM/1071/22/FUL<br>Rock revetment repair and reinforcement along a 4.5km section of the Humber Estuary, works to repair, reinstate and enable access to the gravity outfalls at Middle Drain, Oldfleet Drain and Mawmbridge Drain, associated landscape improvements, installation of temporary construction compounds and associated infrastructure | 1.6km from the Site | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC |

| ID | Project | Distance From IGET Project | Impact Pathways Relevant to the Shadow HRA In-combination Assessment |
|---|---|---|---|
| | | | • Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>• Disturbance through underwater noise and vibration<br>• Airborne noise and visual disturbance |
| 120. | PA/2023/422<br>Phillips 66 Ltd, Eastfield Road,<br>Planning permission for the construction and operation of a post-combustion carbon capture plant, including carbon dioxide compression and metering, cooling equipment, stacks, substations, new and modified services, connections, internal roads, new access onto Eastfield Road, and maintenance and laydown areas (EIA development) | 3.89km | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants |
| 136. | ~~Immingham Onshore Wind~~DM/0329/24/FUL<br>Erection of one wind turbine (T2), measuring up to 149.9m to blade tip height. Associated ancillary infrastructure to include access tracks, hardstanding areas for the turbine location, electrical infrastructure, drainage works, temporary laydown areas, temporary construction compound and associated works | ~~Approx. 2 km~~1.2km | **Disturbance (including collision risk)**<br>• Airborne noise and visual disturbance<br>• Collision risk |

**Table 36: The potential for an AEOI on qualifying habitats and species of the Humber Estuary SAC and the Wash and North Norfolk Coast SAC due to in-combination effects.**

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| 9 | DM/0865/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound – Site 4 | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction:**<br>The air quality assessment that informed the planning application for ID9 (Air Quality Consultants ("AQC"), 2019) considered the impact of this particular generator site in isolation, and the impact of this site along with three sister generator sites in-combination. The assessment of all four generator sites in operation identified that the bulk of the impact from these cumulative developments occurred at locations where there is no relevant air quality exposure. Impacts of less than 0.6 µg/m³ of $NO_2$ (i.e. rounded to 1% or less of the air quality objective) were predicted at receptors on Queens Road and receptors on the eastern fringe of Immingham town.<br>It is noted that the air quality assessment prepared by AQC screened out the impact of the four generator site emissions on the nature conservation receptors, due to lack of sensitivity.<br>A second air quality assessment was submitted to inform the planning application for the site in 2020 (Air Pollution Services, 2020). It quantified the impact of the four energy generation sites at several locations within the Humber Estuary SAC. The vast majority of which were mudflat habitat, which have not been considered sensitive to air quality impacts in the Project ES[1]. At the saltmarsh habitat considered in that assessment, the impact (or Process Contribution) accounted for 0.15% of the current lower Critical Load threshold for nitrogen deposition. Annual mean $NO_X$ impacts at this location were not reported. Construction phase emissions associated with the Project will be negligible at this same location.<br>**Operation**:<br>The second air quality assessment reported impacts that accounted for 0.15% of the current lower Critical Load nitrogen deposition. Operational phase emissions of the Project and IERRT emissions at this same location (receptor O-E5), account for up to 0.4% of the same lower Critical Load threshold assuming MARPOL Regulation 13 Tier II emission standards and 0.3% assuming Tier III standards. As the combined nitrogen deposition is below the 1% screening threshold for both modelled scenarios, there is therefore no potential for adverse in-combination effects on the designated site as result of nitrogen deposition.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 10 | DM/0864/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound - Site 3 | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**:<br>As per assessment reported for ID9.<br>**Operation**:<br>As per assessment reported for ID9.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 13 | DM/0628/18/FUL<br>Partially demolish existing building and erect 20MWE waste to energy power generation facility, 65m | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction:**<br>Cumulative development impacts are predicted at a location within the Humber Estuary SAC and at two SSSI locations. The location of the cumulative impact reported for the SAC is for an area of mudflat habitat. As discussed in **Chapter 6: Air Quality [APP-048]**, the Project assessment does not consider mudflat in the Humber Estuary to be sensitive to air quality impacts[1]. At the saltmarsh habitat |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | stack and associated plant, machinery | and other annuals colonising mud and sand | | considered in the cumulative development's air quality assessment (the North Killingholme Haven its SSSI) the impact (or process contribution) accounts for 0.1% of the lower Critical Load threshold. Construction phase emissions associated with the Project are anticipated to have a negligible impact at this location.<br>**Operation:**<br>The saltmarsh habitat that was considered in the cumulative development air quality assessment (the North Killingholme Haven its SSSI) will experience an impact (or process contribution) that accounts for 0.1% of the lower Critical Load threshold. At the same location, the operational Project and IERRT impact is 0.2% of the Critical Load (assuming all vessels visiting the Project are MARPOL Regulation 13 Tier II compliant).<br>Again, the cumulative development's air quality assessment (Ref 1-221) does not report impacts at the nature conservation sites worst affected by the operation of the Project, the annual mean $NO_2$ contour plot it does include can be used to make a reasoned estimate. The contour plot suggests that at the locations of maximum nature conservation impact in the Project's assessment, the cumulative development has an annual mean $NO_2$ impact of around 0.1 µg/m³, which would convert to a nitrogen deposition impact of around 0.014 kg/ha/yr (or 0.1% of the Critical Load). Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 16 | DM/0862/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound - Site 1 | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**:<br>As per assessment reported for ID9.<br>**Operation**:<br>As per assessment reported for ID9.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 17 | DM/0863/19/FUL<br>Erection of 20MW gas fuelled embedded energy generation compound - Site 2 | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**:<br>As per assessment reported for ID9.<br>**Operation**:<br>As per assessment reported for ID9.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 18 | DM/0026/18/FUL<br>Erect an Energy Recovery Facility with an electricity export capacity of up to 49.5MW and associated infrastructure including a stack to 90m high | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction:**<br>The cumulative development's emissions modelling assessment reported an annual mean $NO_X$ impact of 2% of the Critical Level and a nitrogen deposition impact of 0.2 kg/ha/yr (or 2% of the lower Critical Load threshold and 1% of the upper Critical Load threshold) at the worst affected saltmarsh habitat. Construction phase impacts of the Project are expected to have a limited impact at this location of shared sensitivity, due to its distance away from the construction site boundary. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | | | **Operation:**<br>The cumulative development's emissions modelling assessment reported an annual mean $NO_X$ impact of 2% of the Critical Level and a nitrogen deposition impact of 0.2 kg/ha/yr (or 2% of the lower Critical Load threshold and 1% of the upper Critical Load threshold) at the worst affected saltmarsh habitat. Worst-case combined emissions (assuming all IGET vessels are MARPOL Regulation 13 Tier II compliant) account for 6% of the Critical Level for annual mean $NO_X$ and 2% of the lower Critical Load Threshold (1% of the upper Critical Load threshold) at a comparable saltmarsh location (receptors O_E1 and O_E2). Where IGET vessels are all MARPOL Regulation 13 Tier III compliant, the Project and IERRT emissions account for 3% of the Critical Level for $NO_X$, 1% of the lower Critical Load threshold for nitrogen deposition (0.5% of the upper Critical Load threshold). Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 21 | EN010107<br>South Humber Bank Energy Centre | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**:<br>At the shared nature conservation sensitive saltmarsh receptors, the cumulative development impact to annual mean $NO_X$ accounts for around 2.5% of the Critical Level and the nitrogen deposition rate around 4% of the current lower Critical Load threshold. However, the impact of the Project's construction phase emissions at this location is considered to be negligible, due to the distance between the cumulative development's impacted saltmarsh habitat and the Project's construction phase emissions sources.<br>**Operation**:<br>The cumulative development impact to annual mean $NO_X$ of around 2.5% of the Critical Level and the nitrogen deposition rate of around 4% of the Critical Load occurs at the same location as the IGET saltmarsh receptor O_E5. Here, IGET and IERRT impacts account for 1% of the Critical Level for $NO_X$ and 0.4% of the Critical Load for nitrogen deposition, assuming IGET vessels comply with MARPOL Regulation 13 Tier II emission standards, and 0.5% of the Critical Level for $NO_X$ and 0.3% of the Critical Load for nitrogen deposition, where IGET vessels comply with Tier III emission standards. Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 35 | DM/0329/18/FUL<br>Erection of industrial building and adjoined two storey office/control room to create power plant (18MW Energy From Waste) | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**<br>At the saltmarsh habitat to the north of the cumulative development site, cumulative development impacts account for 4% of the Critical Level for $NO_X$ and 3.6% of the lower Critical Load threshold for nitrogen deposition (1.8% of the upper Critical Load threshold).<br>Given the distance between the cumulative development and the Project, the fact that IGET project construction emissions will impact close to source and the fact that the IGET Project's key receptors are not located downwind of the cumulative development, the risk of cumulative impacts with this are considered low.<br>**Operation**<br>At the saltmarsh habitat to the north of the cumulative development site (similar to IGET receptor O_E5), cumulative development impacts account for 4% of the |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | | | Critical Level for $NO_X$ and 3.6% of the lower Critical Load threshold for nitrogen deposition (1.8% of the upper Critical Load threshold). IGET Project and IERRT impacts at the same location account for 1.1% of the Critical Level for $NO_X$ and 0.4% of the lower Critical Load threshold for nitrogen deposition (0.2% of the upper Critical Load threshold), assuming IGET vessels all comply with Tier II emission standards. Based on IGET vessels complying with Tier III standards, IGET Project and IERRT impacts at the same location account for 0.5% of the Critical Level for $NO_X$ and 0.3% of the lower Critical Load threshold for nitrogen deposition (0.15% of the upper Critical Load threshold). Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br><br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 37 | DM/1070/18/FUL<br><br>Construction of an energy from waste facility of up to 49.9MWe gross capacity including emissions stack(s) and associated infrastructure | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br><br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br><br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**:<br><br>Impacts associated with the cumulative development relate to those from its energy centre plant stack emissions.<br><br>At the saltmarsh habitat to the north of the cumulative development site, cumulative development impacts account for 2.5% of the Critical Level for $NO_X$ and 4% of the lower Critical Load threshold for nitrogen deposition (2% of the upper Critical Load threshold). Given the distance between the larger cumulative development impacts and the IGET Project, the fact that IGET project construction emissions will impact close to source and the fact that the IGET Project's key receptors are not located downwind of the cumulative development, the risk of cumulative impacts with this project being anything more than negligible are considered low.<br><br>**Operation**:<br><br>Impacts associated with the cumulative development relate to those from its energy centre plant stack emissions.<br><br>At the saltmarsh habitat to the north of the cumulative development site, cumulative development impacts account for 2.5% of the Critical Level for $NO_X$ and 4% of the lower Critical Load threshold for nitrogen deposition (2% of the upper Critical Load threshold). IGET Project and IERRT impacts at the same location account for 1.1% of the Critical Level for $NO_X$ and 0.4% of the lower Critical Load threshold for nitrogen deposition (0.2% of the upper Critical Load threshold), assuming IGET vessels all comply with Tier II emission standards. Based on IGET vessels complying with Tier III standards, IGET Project and IERRT impacts at the same location account for 0.5% of the Critical Level for $NO_X$ and 0.3% of the lower Critical Load threshold for nitrogen deposition (0.15% of the upper Critical Load threshold). Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br><br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 95 | PA/2018/918<br><br>Planning permission to construct a new gas-fired power station with a gross electrical output of up to 49.9 megawatts. A further non-material amendment application has been made (PA/2021/1039) | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br><br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br><br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**:<br><br>Impacts from the cumulative development are set out in the air quality assessment that supported its ES (Ref 1-222), and concern emissions from the operation of an OCGT plant.<br><br>During the cumulative development's construction phase, it has impacts on annual mean $NO_X$ of less than 0.1% of the Critical Level at an area that represents the nearest and worst-affected section of saltmarsh habitat (represented in the IGET air |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | | | quality assessment as receptor O_E6). During the cumulative development's operation, the same saltmarsh habitat experiences an impact of 0.5% of the Critical Level for $NO_X$ and <0.1% of the Critical Load for nitrogen deposition.<br>**Operation**:<br>During the cumulative development's operation, the same saltmarsh habitat experiences an impact of 0.5% of the Critical Level for $NO_X$ and <0.1% of the Critical Load for nitrogen deposition. At this location, operational IGET Project and IERRT emissions have an impact that is 1% of the Critical Level for $NO_X$ and 0.4% of the Critical Load for nitrogen deposition (assuming IGET vessels are MARPOL Regulation 13 Tier II compliant). Assuming vessels are Tier III compliant, IGET Project and IERRT have emissions have an impact that is 0.5% of the Critical Level and 0.3% of the Critical Load.<br>Given the distance between the saltmarsh habitat most affected by the cumulative development impacts and the IGET Project, the limited impact of the cumulative development and the fact that IGET project construction emissions will impact close to source, the risk of cumulative impacts with this project being anything more than negligible are considered low.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 116 | DM/0664/19/FUL<br>Velocys Waste to Fuel Plant, off Moody Lane - Development of a sustainable transport fuels facility, including various stacks up to 80m high, creation of new accesses, installation of pipelines, rail link, associated infrastructure and ancillary works | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**<br>The construction of the cumulative development has limited potential to generate emissions that could contribute significant effects at shared receptors with the IGET Project's construction, due to the distance between the cumulative development site and the nearest air quality sensitive receptors.<br>The cumulative development's air quality assessment only provides a location of maximum impact within the Humber Estuary SAC, and not an impact specific to any habitat. It reports an annual mean $NO_X$ impact of 1% of the Critical Level and nitrogen deposition rate that is 0.56% of the current lower Critical Load threshold for that habitat type (or 0.28% of the upper Critical Load threshold). Due to the distance between the shared saltmarsh habitat closest to both the cumulative development site and the IGET Project, cumulative effects will be limited.<br>**Operation**<br>The construction of the cumulative development has limited potential to generate emissions that could contribute significant effects at shared receptors with the IGET Project's operation, due to the distance between the cumulative development site and the nearest air quality sensitive receptors.<br>The cumulative development's air quality assessment only provides a location of maximum impact within the Humber Estuary SAC, and not an impact specific to any habitat. It reports an annual mean $NO_X$ impact of 1% of the Critical Level and a nitrogen deposition rate that is 0.6% of the current lower Critical Load threshold for that habitat type (or 0.3% of the upper Critical Load threshold). The closest area of saltmarsh to the cumulative development is represented in the IGET air quality assessment as receptor O_E5, where impacts account for 1.1% of the annual mean Critical Load for $NO_X$ and 0.4% of the lower Critical Load threshold of nitrogen deposition (0.2% of the upper Critical Load threshold), assuming MARPOL Regulation 13 Tier II emission limits. With Tier III emission limits, IGET Project and IERRT impacts account for 0.5% and 0.3% of the Critical Level and Lower Critical |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | | | Load threshold respectively (0.15% of the upper Critical Load threshold). Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 117 | PA/SCO/2022/7<br>Station Road South Killingholme, works on land to the east of Rosper Road, Killingholme | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | The cumulative development works being proposed are located 550m away from the saltmarsh habitat at their nearest point. Construction site emissions are released from sources close to ground level and cumulative development impacts are most likely to effect locations with 200m of the cumulative development site boundary.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 115. | MLA/2014/00431/4<br>Maintenance dredge disposal at Grimsby, Immingham and Sunk Dredged Channel | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss/damage**<br>The habitats in the area are already subject to considerable seabed disturbance as a result of the existing maintenance dredging regime. The variations proposed to this existing maintenance dredge licence will not change the volumes of material to be dredged from the Port of Immingham area. The marine habitats and species occurring in the area are also considered to be commonly occurring and of low conservation value. Changes during dredging as a result of the Project are considered to be localised and of low magnitude and in-combination with this maintenance dredging project will result in only a very small increase in the potential maintenance dredge commitment for the Immingham area and disposal site.<br>**Contamination**<br>The physical processes assessment of the proposed scheme indicates a negligible future maintenance dredge requirement for the IGET berths. Similarly to the existing adjacent berths at IOT, the flow regime within the berth pocket is considered sufficient to keep the bed generally swept clear of deposited material. Some limited accretion is predicted underneath the IGET jetty head and, should this accrete sufficiently to spill over into the berth pocket, some very limited future maintenance dredge may be required. If it is, however, this is likely to be very infrequent (years between campaigns) and for a very small volume of material (considerably lower than the initial capital dredge). For completeness, the following assessment considers the potential for cumulative effects with respect to increased SSC as a result of the possible limited maintenance dredging and disposal of material from IGET alongside the existing disposals from Grimsby, Immingham, and Sunk Dredged Channel.<br>The assessment of the potential future maintenance dredging requirements for the Project indicates a negligible future maintenance dredge requirement. In-combination effects from dredge or disposal plumes from adjacent sites will only exist for a short period of time (a matter of hours) when activities are taking place concurrently. Once the next peak tide (ebb or flood) has dispersed the plume across the wider study area, the increased SSC values are unlikely to be distinguishable from the existing background concentrations. It is also considered likely that the availability of dredging plant (servicing the ports and approaches across the wider Humber, including Goole, Hull and Grimsby) will mean the potential for dredging to be taking place at adjacent locations and at the same time is limited.<br>In relation to the release of sediment -bound contaminants, the Marine Licence requires sediment samples to be tested in line with OSPAR requirements prior to disposal which minimises the potential for mobilisation of contaminants. In addition, the Project is concerned with the disposal of recently accreted sediment which is |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | | | less likely to comprise a source of historic contamination and therefore this is unlikely to result in a cumulative effect.<br>Considering all pathways, and the very limited potential (in terms of frequency and volume) for any maintenance dredge requirement for the Project, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | Habitat loss/damage<br>• Physical change to habitats resulting from the deposition of airborne pollutants | The cumulative development is the continuation of dredging the Sunk Channel in the Humber Estuary. This activity is already undertaken in the baseline and associated cumulative emissions accounted for in the baseline dataset used to inform the air quality assessment for the IGET Project. Where cumulative development impacts occur close to air quality sensitive receptors, the number of emissions sources will be limited as will the period in which emissions occur, to the extent that a significant cumulative effect is unlikely.<br>It is concluded that in-combination changes in air quality arising from the two projects will result in no AEOI. |
| | | S1095: Sea lamprey *Petromyzon marinus* | Disturbance<br>• Disturbance through underwater noise and vibration | There is the potential for cumulative effects on lamprey and seal features if the dredging activities associated with MLA/2014/00431 occur at the same time as construction and maintenance dredging as part of the Project.<br>The noise associated with MLA/2014/00431 is likely to be similar to the dredging operations for the Project and will be limited due the intermittent operation over the course of a year. It is also considered likely that the availability of dredging plant (servicing the ports and approaches across the wider Humber, including Goole, Hull and Grimsby) will mean the potential for dredging to be taking place at adjacent locations and at the same time is limited.<br>Further, dredging for both projects is only expected to cause behavioural reactions (at most) in a relatively localised area in the vicinity of the dredger. Therefore, assuming the proposed mitigation measures for the Project are implemented, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | S1099: River lamprey *Lampetra fluviatilis* | | |
| | | S1364: Grey seal *Halichoerus grypus* | | |
| | | S1365: Harbour seal *Phoca vitulina* | | |
| 94. | MLA/2020/00520<br>Humber International Terminal (HIT) berth 2: adaptation for car carriers | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination** | **Habitat loss/damage**<br>The piles required for the HIT berth 2 works will result in a *de minimis* loss of subtidal habitat. In addition, sedimentation due to the localised resuspension of sediment as a result of seabed disturbance during marine piling and changes to hydrodynamic and sedimentary processes due to the presence of the piles including potential scouring directly around piles effects are anticipated to be negligible and highly localised. Furthermore, the benthic community is expected to recover relatively rapidly from any localised physical disturbance with subtidal species known to occur in the area typically considered fast growing and/or have rapid reproductive rates. The cumulative effects of physical loss of habitat are considered negligible.<br>**Contamination**<br>In relation to water and sediment quality, there is the potential for cumulative effects with respect to increased SSC and changes to dissolved oxygen and chemical water quality as a result of seabed disturbance during marine piling. Any changes would cause highly localised and temporary changes in suspended sediment levels (and |

Merged Cells

Split Cells

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | • Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | related changes in sediment bound contaminants and dissolved oxygen) and the effects are considered negligible on features for both projects.<br>**Air Quality**<br>The construction and operation of the cumulative development during the operation of the Project will likely cause some cumulative effect at the nearby saltmarsh habitat, which is represented in the Project assessment as receptor (O_E6). At this location, the Project and IERRT emissions account for 1% of the Critical Level for annual mean $NO_X$ and 0.4% of the lower Critical Load threshold for nitrogen deposition (0.2% of the upper Critical Load threshold), assuming IGET vessels all comply with Tier II emission standards. Based on IGET vessels complying with Tier III standards, IGET Project and IERRT impacts at the same location account for 0.5% of the Critical Level for NOX and 0.3% of the lower Critical Load threshold for nitrogen deposition (0.15% of the upper Critical Load threshold).<br>The cumulative development is the continuation of dredging the Sunk Channel in the Humber Estuary. This activity is already undertaken in the baseline and associated cumulative emissions accounted for in the baseline dataset used to inform the air quality assessment for the Project. Where cumulative development impacts occur close to air quality sensitive receptors, the number of emissions sources will be limited as will the period in which emissions occur, to the extent that a significant cumulative effect is unlikely.<br>It is concluded that in-combination changes in air quality arising from the two projects will result in no AEOI.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis*<br>S1364: Grey seal *Halichoerus grypus*<br>S1365: Harbour seal *Phoca vitulina* | **Disturbance**<br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the Project along with HIT berth 2 works have the potential to result in cumulative effects on lamprey and grey seal features of the Humber Estuary SAC and the harbour seal feature of the Wash and North Norfolk Coast SAC. Marine piling noise has the potential to cause injury effects in fish and marine mammals within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber estuary for both projects. Any barrier to movements caused by the noise during piling for the Project would be temporary with significant periods during a 24-hour period when no piling will be undertaken (the actual proportion of marine piling is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements of marine mammals through the Humber Estuary. Piling noise will take place for a small amount of time each day over a period of approximately 343 days. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect. Both projects will require similar mitigation to help minimise potential adverse effects (such as soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers).<br>It is assumed that both projects will be subject to controls by the statutory bodies to avoid the potential for cumulative and in-combination effects on features of designated sites. Therefore, assuming the proposed mitigation measures for both projects are implemented, the predicted residual ~~a~~in-combination effects are not |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | considered to compromise any of the conservation objectives, and it is therefore concluded that there is no potential for AEOI on qualifying interest features. |
| 25. | TR030001, TR030005 and TR030006<br>Able Marine Energy Park including Material Changes 1 and 2 | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss/damage** Both AMEP and the Project have the potential to result in changes to marine habitats as a result of capital dredging due to physical disturbance during sediment removal, sediment deposition and indirectly as a result of changes to hydrodynamic and sedimentary processes. These potential effects were assessed as not resulting in an AEOI for both projects. The subtidal habitats around the Port of Immingham are typically impoverished and of low ecological value reflecting the existing high levels of physical disturbance in the area due to strong near bed tidal currents and sediment transport. Deposition of sediment as a result of dredging for both projects was predicted to be localised and similar to background variability away from the dredge pockets with species occurring in the local area considered tolerant to some sediment deposition. The cumulative effects of change on marine habitats and species from the highly localised and small scale predicted effects due to hydrodynamic and sedimentary processes are considered negligible.<br>The AMEP project will result in a direct loss of intertidal habitat (mudflat and saltmarsh) as a result of the reclamation of the proposed quay (33 ha). Compensation for this loss will be provided at the Cherry Cobb Sands compensation site. Loss of intertidal (both direct and indirect) as a result of the Project will be *de minimis* (up to 0.0421 ha) and not considered to result in an AEOI. Therefore, with the provision of the compensatory habitat required for AMEP, there is no cumulative effect taking account of the Project that could compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Contamination**<br>In relation to water and sediment quality, there is the potential for cumulative effects with respect to increased SSC and changes to dissolved oxygen and chemical water quality as a result of seabed disturbance. Any changes would cause localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) and the effects on features are considered negligible on features.<br>In relation to the release of sediment -bound contaminants, the level of contamination in the proposed dredge areas for both projects is considered to be low with material expected be rapidly dispersed by strong tidal currents in the area.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Air Quality**<br>*Construction*<br>At the worst-impacted nature conservation site within the SAC from the cumulative development emissions, annual mean $NO_X$ impacts account for 0.3% of the Critical Level and nitrogen deposition rates account for 0.014 kg/ha/yr (or 0.1% of the lower Critical Load threshold for saltmarsh habitat). It is considered that the impact of IGET construction phase emissions at this same location is likely to be negligible, given the distance between the development work areas. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | *Operation*<br><br>At the worst-impacted nature conservation site within the SAC from the cumulative development emissions, annual mean $NO_X$ impacts account for 0.3% of the Critical Level and nitrogen deposition rates account for 0.014 kg/ha/yr (or 0.1% of the lower Critical Load threshold for saltmarsh habitat). It is not clear where this impact occurs within the SAC. If it is assumed that this impact occurs at the closest section of saltmarsh to the cumulative development site, the shared receptor would be receptor O_E6, which is predicted to experience an IGET Project and IERRT impact of 1% of the Critical Level for annual mean $NO_X$ and 0.4% of the nitrogen deposition Critical Load for saltmarsh (assuming IGET vessels comply with Tier II emission standards). The combined impact with the cumulative development is 1% or less of the relevant air quality standards. The cumulative development is the continuation of dredging the Sunk Channel in the Humber Estuary. This activity is already undertaken in the baseline and associated cumulative emissions accounted for in the baseline dataset used to inform the air quality assessment for the Project. Where cumulative development impacts occur close to air quality sensitive receptors, the number of emissions sources will be limited as will the period in which emissions occur, to the extent that a significant cumulative effect is unlikely.<br><br>It is concluded that in-combination changes in air quality arising from the two projects will result in no AEOI. |
| | | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | The traffic data used to inform the air quality assessment for the Project is inherently cumulative with regards to the Consent Order for the AMEP. There are no predicted in-combination effects and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | S1095: Sea lamprey *Petromyzon marinus*<br><br>S1099: River lamprey *Lampetra fluviatilis*<br><br>S1364: Grey seal *Halichoerus grypus*<br><br>S1365: Harbour seal *Phoca vitulina* | **Disturbance**<br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the Project along with the AMEP works have the potential to result in cumulative effects on lamprey and grey seal features of the Humber Estuary SAC and the harbour seal feature of the Wash and North Norfolk Coast SAC. Dredging for both projects is only expected to cause behavioural reactions in a relatively localised area in the vicinity of the dredger for both fish and marine mammals. Marine piling noise has the potential to cause injury effects in fish and marine mammals within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber estuary for both projects. Any barrier to movements caused by the noise during piling for the Project would be temporary with significant periods during a 24-hour period when no piling will be undertaken (the actual proportion of marine piling is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements of marine mammals through the Humber Estuary. Piling noise will take place for a small amount of time each day over a period of approximately 343 days. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect. Both projects will require similar mitigation to help minimise potential adverse effects (such as soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers).<br><br>It is assumed that both projects will be subject to controls by the statutory bodies to avoid the potential for cumulative and in-combination effects on features of designated sites. Therefore, assuming the proposed mitigation measures for both |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | projects are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 28. | EN070006<br>Humber Low Carbon Pipelines | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | Based on information provided in the EIA scoping report for the Humber Low Carbon Project, trenchless methods (e.g., bored tunnel) could be used to minimise potential effects on SAC habitats where the pipelines cross the Humber Estuary. However, construction method has not been confirmed at the landfall (trenchless, e.g., Horizontal Directional Drilling ("HDD2), or via cofferdam) and, therefore, features of the SAC could not be scoped out.<br>Given the current uncertainties with respect to the construction methods and programme for the Humber Low Carbon Pipeline, a detailed assessment of effects on SAC features is not considered possible. However, it is assumed that if required this project will be subject to controls by statutory bodies to avoid the potential for any adverse effects on SAC features. Therefore, assuming the proposed mitigation measures are followed for the Project, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and a conclusion of no AEOI can be reached. |
| | | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis*<br>S1364: Grey seal *Halichoerus grypus*<br>S1365: Harbour seal *Phoca vitulina* | **Disturbance**<br>• Disturbance through underwater noise and vibration | |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| 29. | EN070008<br>Viking CCS Pipeline | S1099: River lamprey *Lampetra fluviatilis* | **Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>**Disturbance**<br>Disturbance through underwater noise and vibration | Only the onshore transportation system is being considered as part of the Viking CCS Pipeline DCO application. No marine works are proposed as part of the terrestrial development. In addition, in-combination air quality effects are not anticipated since no construction vehicles associated with that project will travel within 200m of any European site and there are no operational emissions. However, there is considered to be the potential for effects on river lamprey (which migrate through the estuary and are a qualifying feature of the Humber Estuary SAC).<br>Watercourses which will be crossed by the proposed Viking CCS Pipeline have the potential to support river lamprey. Smaller watercourses will be crossed using open cut techniques. There is a low risk of direct mortality and / or injury to river lamprey as a result of open-cut crossing methodologies. There is also a risk of noise and vibration impacts on lamprey from drilling techniques particularly if carried out during spawning or migration periods. There is potential risk of indirect impacts from surface runoff from constructions areas (i.e., fine sediments) and impacts on water quality from potential pollution incidents (i.e. chemical spills) thereby having potential effects on aquatic species where there are requirements for works taking place above or in proximity to aquatic habitats. There is also a potential indirect impact from light pollution if lighting used during the construction phase is shining directly on water bodies. However, a wide range of mitigation measures outlined in the CEMP are proposed (Ref 1-223; Ref 1-224).<br>On this basis, with the application of the mitigation proposed for the Viking CCS Pipeline and the mitigation measures proposed for the Project for lamprey species (to minimise underwater noise effects during piling such as soft starts and seasonal restrictions), predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on the river lamprey feature. |
| 22. | TR030007<br>Immingham Eastern Ro-Ro Terminal | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss/damage**<br>*Intertidal habitat loss*<br>The Project will result in the direct loss of 0.0021 ha (due to the marine piling) and a potential indirect loss of 0.04 ha (due to potential erosion as a result of the presence of the jetty causing changes in currents). The IERRT project, including changes made to application (accepted by the Examining Authority on 6 December 2023) will result in direct loss of 0.012 ha (due to marine piling and capital dredging) and potential indirect loss of 0.02 ha (due to potential erosion of the foreshore). The anticipated total loss of intertidal as a result of the Project and IERRT is anticipated to be 0.0541 ha (based on combined direct losses and modelling both schemes together to calculate potential for indirect intertidal losses). The combined intertidal habitat loss represents approximately 0.000148 % of the Humber Estuary SAC and approximately 0.000576 % of the 'mudflats and sandflats not covered by seawater at low tide' feature of the Humber Estuary SAC. The predicted potential indirect intertidal losses for both projects (and direct loss due to capital dredging for IERRT), consist of very narrow strips on the lower shore around the sublittoral fringe. These losses are considered to be of a similar scale to that which can occur due to natural background changes in mudflat extent in the local region (e.g. due to seasonal patterns in accretion and erosion or following storm events). These de minimis changes in mudflat extent are of a magnitude that will not change the overall structure or functioning of the nearby mudflats within the Port of Immingham area or more widely in the Humber Estuary. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | *Subtidal habitat loss*<br>Marine piling will result in a direct loss of 0.059 ha and 0.032 ha of seabed habitat for the Project and IERRT respectively. This combined habitat loss of 0.091 ha represents approximately 0.000248 % of the Humber Estuary SAC. The combined loss in subtidal habitat as a result of the piles is considered negligible in the context of the extent of the overall amount of similar marine habitats found locally in the Humber Estuary. All the species recorded were considered commonly occurring and not protected. Furthermore, faunal assemblage recorded during project specific benthic surveys for both projects are also considered characteristic of subtidal habitats found more widely in this section of the Humber Estuary. Localised losses of this magnitude are also not considered to adversely affect the overall functioning of subtidal habitats within this section of the Humber Estuary.<br>*Change to marine habitats:*<br>Capital dredging for the Project will remove 4,000m³ of material over a maximum area of approximately 10,000m² (with the capital dredge for IERRT removing approximately 190,000m³ of material over a maximum area of approximately 70,000m²). For both projects following dredging, it is considered likely that the dredge pocket would provide similar substrate for infaunal colonisation to that under pre-dredge conditions which would then be expected to be recolonised by a similar assemblage to baseline conditions. In addition, sedimentation as a result of capital dredging for both projects is predicted to be highly localised and similar to background variability. Species recorded in both dredge footprint areas are considered tolerant to the predicted millimetric changes in deposition and therefore smothering effects as considered unlikely. In addition, the species recorded in the benthic invertebrate surveys are fast growing and/or have rapid reproductive rates which allow populations to fully re-establish in typically less than one to two years and for some species within a few months.<br><br>Maintenance dredging for the Project is expected to be very limited (if required at all). As a result, any dredging that is required will only be undertaken very periodically (frequency will be dictated by operational requirements but is anticipated there could be several years or more between maintenance dredge campaigns). For the IERRT project, regular maintenance dredging (i.e. occurring every 3-4 months) is anticipated to be restricted to a relatively small proportion of the total maintenance dredge area (i.e. focused around the finger pier piles and adjacent areas of the berth pockets and pontoons). The remainder of the area will only be required to be dredged much more periodically (frequency in these areas will be dictated by operational requirements but is anticipated to be approximately every 1-2 years or more). In both areas, a generally impoverished benthic community was recorded in the dredge footprint which is likely to reflect the existing high levels of physical disturbance in the area due to strong near bed tidal currents and sediment transport with infaunal populations anticipated to fully re-establish in between several months and 1-2 years. On this basis, given the expected frequency of dredging, a comparable macrofaunal community to pre dredge conditions would be expected to occur over much of both the maintenance dredging footprints.<br>**Contamination**<br>The resuspension of sediment as a result of seabed disturbance during marine piling and capital dredging for both projects will cause highly localised and temporary changes in suspended sediment levels (and related changes in sediment |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | bound contaminants and dissolved oxygen) with potential effects on features considered to be negligible.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | <u>MARPOL Tier III Emissions Standard Vessels Scenario</u><br>In-combination exceedances of the 1% screening threshold (i.e. where predicted emissions >1% of the relevant critical levels/ loads) for MARPOL Tier III vessels were identified for the Project operating alongside the IERRT project at the following Humber Estuary SAC receptors:<br>• NOx >1% of the critical Level at receptors O_E1 and OE_2, and around 1% of the critical level at receptor O_E3. However, these impacts occur at locations where total NOx concentration with the Project and IERRT project in operation account for no more than 53% of the critical level (i.e. the critical level would not be exceeded).<br>• Nitrogen deposition – around 1% of the Critical Load at receptors O_E1 and OE_2. However, the Critical Load for nitrogen deposition is already exceeded by the background contribution alone and the in-combination contribution accounts for just 0.9% of the total nitrogen deposition predicted at these locations.<br>• $SO_2$ – critical levels not exceeded at any location.<br>• $NH_3$ – critical levels are not exceeded at any location.<br><u>Since the '1% of the critical load' threshold will not be exceeded, it can be concluded that under a MARPOL Tier III scenario the 'in combination' effect for all pollutants would be imperceptible and no adverse effect on integrity would arise</u><br><u>MARPOL Tier II Emissions Standard Vessels Scenario</u><br><u>In-combination exceedances of the 1% screening threshold (i.e. where predicted emissions >1% of the relevant critical levels/ loads) for MARPOL Tier II vessels were identified for the Project operating alongside the IERRT project at the following Humber Estuary SAC receptors:</u><br>• NOx >1% of the critical level at receptors O_E1, OE_2, OE_3 and OE_4 and around 1% of the critical level at receptors O_E5, OE_6 and OE_7. However, impacts of more than 1% occur at locations where total NOx concentration with the Project and IERRT project in operation account for no more than 57% of the critical level (i.e. the critical level would not be exceeded).<br>• Nitrogen deposition – around 1% of the critical load at receptors O_E1 and OE_2, and less than 1% of the critical load at all other receptors. However, the critical load for nitrogen deposition is already exceeded by the background contribution alone and the in-combination contribution accounts for just 1.4% of the total nitrogen deposition predicted at these locations.<br>• SO2 – critical levels not exceeded at any location<br>• NH3 – critical levels are not exceeded at any location<br>Therefore, the impact of the Project 'in combination' with the IERRT project, on nitrogen deposition under a MARPOL Tier II emissions scenario is greater than 1% |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | of the critical load (being approximately 2% of the critical load) at two receptor locations, and therefore needs further consideration.<br><br>For saltmarsh, the APIS provides a Critical Load range of 10 - 20 kg/ha/yr and nitrogen inputs have been experimentally demonstrated to have an effect on overall species composition of saltmarsh. However, the Critical Loads on APIS are generic for each habitat type and cover a wide range of deposition rates. They do not (and are not intended to) take other influences (to which the habitat on a given site may be exposed) into consideration.<br><br>Moreover, it is important to note from APIS that the experimental studies which underlie conclusions regarding the sensitivity of saltmarsh have '… *neither used very realistic N doses nor input methods i.e. they have relied on a single large application more representative of agricultural discharge*', which is far in excess of anything that would be deposited from atmosphere. Expert judgement is therefore required in order to determine which part of the critical load range to use for saltmarsh habitat.<br><br>Generally, nitrogen inputs from the air are not as important to plants as nitrogen from other sources. Effects of nitrogen deposition from atmosphere are likely to be dominated by much greater impacts from marine or agricultural sources. This is reflected on APIS itself, which states regarding saltmarsh that 'Overall, N deposition [from atmosphere] is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs'. Another mitigating factor is that the nature of intertidal saltmarsh in the Humber estuary means that there is daily flushing from tidal incursion. This is likely to further reduce the role of nitrogen from atmosphere in controlling botanical composition.<br><br>The change in threshold values for critical loads in APIS has been informed by recent studies in Ireland and the Netherlands, and a collaboration under the Working Group on Effects ("WGE") of the UNECE Convention on Long-Range Transboundary Air Pollution reported by the German Environment Agency (Ref 1)-. That research has shown that position of the saltmarsh in the tidal profile is relevant to which part of the critical load range is more appropriate. This is because the less the frequency or duration of inundation by seawater, the more important atmosphere becomes as a source of nitrogen. The APIS Site Relevant Critical Load app for the Humber Estuary SAC states that the lowest part of the new critical load range for upper saltmarsh (10 kg N/ha/yr) is most appropriate to the '*more densely vegetated upper marsh (e.g. EUNIS class MA223, MA224)*' with the highest part of the range being more appropriate for more frequently inundated marsh. Classes MA223 and MA224 are '*regularly but not daily flooded by seawater*' with a figure cited of 100-200 days/year.<br><br>The evidence therefore leads to the conclusions that the upper part (20 kgN/ha/yr) of the critical load range is appropriate for the affected areas of saltmarsh. It follows that the additional predicted contribution from nitrogen emissions from the Project does not result in any exceedance of the Critical Load range for saltmarsh, as the modelled annual mean deposition rate at receptor O_E12 will be 16.0 kg N/ha/yr, which is well below the 20 kg N/ha/yr upper critical load.<br><br>Moreover, guidance within the Highways Agency's Design Manual for Roads and Bridges ("DMRB") in respect of Air Quality (Ref 1-238), identifies a threshold of 0.4 kg N/ ha/ yr as resulting in 'no significant effect' on all habitats based on Natural England Research Report NECR 210 (Ref 1-239), which collated dose response research and found that the lowest additional nitrogen deposition to reduce species richness in any habitat by one species was 0.4 kg/ N/ ha/ yr. The modelled |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | cumulative Process Contribution from the Project under the worst-case MARPOL Tier II Emissions Standards scenario is 0.2 kg/ N/ ha/ yr and therefore is well under this threshold for effecting a measurable change in vegetated habitat species diversity. Although the emissions to air arising from the Project are mainly from marine vessels, as the pollutants are the same as those assessed for road vehicle engine emissions in the DMRB, it is considered appropriate to apply this threshold in the assessment for the Project.<br><br>In addition, Natural England's Supplementary Advice on Conservation Objectives for the Humber Estuary SAC states that the conservation objective for the '*Atlantic salt meadows Glauco-Puccinellietalia maritimae*' and '*Salicornia and other annuals colonising mud and sand*' habitat features relevant to the assessment of air quality effects is to "*Maintain concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature on the Air Pollution Information System*" (Ref 1-240). As set out above, the Process Contribution from the Project, which results in a mean deposition rate of 16 kg N/ ha/ yr on the nearest saltmarsh habitat does, not result in any exceedances of the Critical Load published on the APIS. Indeed, air quality modelling for this Project forecasts a slight improvement in nitrogen deposition between the base year and 2036 even when allowing for the Project and the IERRT. Therefore, the Project will not compromise the air quality 'maintain' target for the Humber Estuary SAC.<br><br>It is therefore concluded that operational emissions from marine vessels and landside plant in combination with emissions from IERRT scheme will not adversely affect the integrity of designated habitats or undermine the conservation objectives within the Humber Estuary SAC. |
| | | S1095: Sea lamprey *Petromyzon marinus*<br><br>S1099: River lamprey *Lampetra fluviatilis*<br><br>S1364: Grey seal *Halichoerus grypus*<br><br>S1365: Harbour seal *Phoca vitulina* | **Disturbance**<br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the IERRT project along with the Project have the potential to result in cumulative effects on lamprey and grey seal features of the Humber Estuary SAC and the harbour seal feature of the Wash and North Norfolk Coast SAC. Dredging for both projects is only expected to cause behavioural reactions in a relatively localised area in the vicinity of the dredger for both fish and marine mammals.<br><br>Piling noise has the potential to cause injury effects in fish and marine mammals within close proximity to the piling activity and strong behavioural responses over a wider area of the Humber estuary for both projects. Lamprey form part of the least sensitive noise hearing fish group according to the Popper *et al*. (2014) guidelines and the predicted zone of behavioural effects are based on the sound levels to which schools of sprat, which are in the highest sensitive noise hearing fish group, responded on 50% of observations (Hawkins *et al*., 2014). The predicted behavioural zone is therefore considered overly precautionary and conservative and is likely to be a more localised area for lamprey. Instantaneous peak Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) effects in grey seal are predicted to occur within close proximity to the impact piling activity and cumulative SEL PTS and TTS effects are predicted over a wider area. Assuming seals evade the injury effects zone, they are not considered to be at risk of any instantaneous or cumulative injury effects during impact piling. Strong behavioural responses may occur over a wider area although the existing constraints of the estuary are such that elevated underwater noise levels generated during piling for the Project and IERRT are physically constrained to within the outer section of the Humber Estuary and are unable to directly reach the grey seal breeding site at Donna Nook. The Spurn on the Outer Humber Estuary and promontory of Grimsby Docks means that much of the underwater noise will be limited by these hard constraints and will not propagate to the outer part of the estuary and beyond. In addition, the upstream |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | bend in the estuary at Salt End will mean that elevated underwater noise levels will not be able to propagate beyond this point. In other words, potential behavioural responses and/or displacement effects are primarily limited to the section of the estuary between around Salt End (upstream) and Grimsby to Spurn Bight (downstream).<br><br>The maximum impact piling scenario for both projects assuming the construction works overlap is for up to 7 tubular piles to be installed each day (4 piles for IERRT and 3 piles for the Project) using up to 6 piling rigs driving at any one time (4 piling rigs for IERRT and 2 piling rigs for the Project).  If none of the pile driving activity for both projects were to occur at the exact same time and temporally overlap over a 24-hour period, the maximum impact pile driving scenario would involve approximately 80 minutes of vibro piling per day (20 minutes for IERRT and 60 minutes for the Project) and 450 minutes of impact piling per day (180 minutes for IERRT and 270 minutes for the Project).<br><br>Any disturbance and barrier to lamprey and grey seal movements caused by the noise during piling for IERRT and the Project would be temporary with periods during a 24-hour period when no piling will be undertaken. The proportion of impact piling is estimated to be at worst around 31 % over a 24-hour period (based on 450 minutes of impact piling per day). In other words, any lamprey and grey seals that remain within the predicted behavioural effects zone at the time of impact piling will be exposed a maximum of up to 31 % over the period of a day. The proportion of vibro piling is estimated to be at worst around 6 % over a 24- hour period (based on 80 minutes of vibro piling per day). In other words, any lamprey and grey seals that remain within the predicted behavioural effects zone at the time of piling will be exposed a total maximum of up to 37 % over the period of a day. In reality, less than 7 piles are likely to be driven per day and also there is likely to be some temporal overlap in the pile driving activity, therefore, the assumptions on maximum pile driving periods and daily exposures are considered to represent a worst case. Piling will also not take place continuously as there will be periods of downtime, pile positioning and set up.<br><br>The same mitigation measures are proposed for both the Project and IERRT to help minimise potential adverse effects (i.e., soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers). In order to take account of any potential in-combination effects should the piling programmes for both projects overlap, it is proposed that the maximum duration of percussive piling permitted within any 4-week period must not exceed a total of 196 hours where any percussive pile drivers for either one or both projects are in operation. Where percussive piling is occurring simultaneously across the two projects these respective time periods will not be double counted as the temporal exposure to this effect is not increased. This restriction applies from 1 June to 30 June and 1 August to 31 October inclusive in any year to minimise the impacts on fish (including lamprey) migrating through Humber Estuary during this period. The measurement of time during each 196-hour work-block must begin at the start of each timeframe, roll throughout it, then cease at the end, where measurement will begin again at the start of the next timeframe, such process to be repeated until the end of piling works. This restriction does not apply to percussive piling that can be undertaken outside the waterbody at periods of low water. This joint restriction will be secured in the outline Construction Environmental Management Plan. Therefore, assuming the proposed mitigation measures for both projects are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| 27. | North Killingholme Power Project | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide | **Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Contamination**<br>Given the extent of seabed disturbance from the North Killingholme Power Project which involves construction of an intake and marine piling any changes would cause highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen). There are no anticipated cumulative effects.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | **Construction**<br>At the worst-impacted saltmarsh habitat site within the SAC, from the worst-case cumulative development emissions, annual mean $NO_X$ impacts account for 4% of the Critical Level and nitrogen deposition rates account for 1.8% of the current lower Critical Load threshold for saltmarsh habitat and 0.9% of the upper threshold. At the saltmarsh habitat within the North Killingholme Haven Pits SSSI, the worst-case cumulative development impacts account for 1.8% of the Critical Level for $NO_X$ and 0.2% of the lower Critical Load threshold for nitrogen deposition. It is considered that the impact of IGET construction phase emissions at these same locations is likely to be negligible, given the distance between the development work areas.<br>**Operation**<br>The worst-case cumulative development emissions have annual mean $NO_X$ impacts of around 4% of the Critical Level and nitrogen deposition rates of around 1.8% of the current lower Critical Load threshold for saltmarsh habitat (0.9% of the upper threshold). At the saltmarsh habitat within the North Killingholme Haven Pits SSSI, the worst-case cumulative development impacts account for 1.8% of the Critical Level for $NO_X$ and 0.2% of the lower Critical Load threshold for nitrogen deposition (0.1% of the upper threshold). Emissions predicted closest to the cumulative development's worst-case impacts are represented by receptor O_E12, where impacts assuming all IGET vessels are MARPOL Regulation 13 Tier II compliant account for 0.4% of the Critical Level for $NO_X$ and 0.2% of the lower Critical Load range for nitrogen deposition. At the SSSI, cumulative impacts account for 0.3% of the Critical Level for $NO_X$ and 0.1% of the lower Critical Load threshold for nitrogen deposition, assuming Tier II emission standards. Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| | | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis*<br>S1364: Grey seal *Halichoerus grypus*<br>S1365: Harbour seal *Phoca vitulina* | **Disturbance**<br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the Project along with construction of the intake and marine piling for the North Killingholme Power Project have the potential to result in cumulative effects on sea and river lamprey and grey seal features in the Humber Estuary. Marine piling noise has the potential to cause injury if these features are within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber Estuary for both projects. Any barrier to movements caused by the noise during piling for the Project would be temporary with significant periods during a 24-hour period when no piling will be undertaken (the actual proportion of marine piling is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | of marine mammals through the Humber Estuary. Piling noise will take place for a small amount of time each day over a period of approximately 343 days. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect. Both projects will require similar mitigation to help minimise potential adverse effects (such as soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers).<br>Assuming appropriate mitigation measures are followed during construction, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 102. | DM/1071/22/FUL<br>Rock revetment repair and reinforcement along a 4.5km section of the Humber Estuary, works to repair, reinstate and enable access to the gravity outfalls at Middle Drain, Oldfleet Drain and Mawmbridge Drain, associated landscape improvements, installation of temporary construction compounds and associated | H1110: Sandbanks which are slightly covered by sea water all the time<br>H1130: Estuaries<br>H1140: Mudflats and sandflats not covered by seawater at low tide | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss/damage**<br>The coastal defence project will result in a permanent loss of 0.25 ha of intertidal habitat in 11 discrete narrow strips averaging 227 m², of which the largest is no more than 10m wide and 30m long. These discrete areas of mudflat loss along the revetment are distanced roughly 100m apart. The HRA undertaken for the Project concluded that *'within the Pyewipe area, there is approximately 300 ha of this Annex 1 habitat, being over 700 m at its widest extent to the south. Therefore, the loss of 0.25 ha equates to a loss of 0.08% of the total mudflats within Pyewipe. The loss of these small and discrete parcels of mudflat along the base of the existing revetment is not considered to adversely affect the function of the mudflats as a self-sustaining habitat within the Pyewipe area. This impact is considered to be ecologically inconsequential to the Humber Estuary SAC and so not adversely affecting the integrity of the site. As the impact is considered to be ecologically inconsequential, it is not considered to frustrate the conservation objective of restore the total extent. No adverse effect on the site integrity of the Humber Estuary SAC is anticipated as a result of loss of habitat constituting the qualifying feature of mudflats and sandflats not covered by seawater at high tide associated with construction of rock armour revetment*'. It should also be noted that indirect loss could also occur with respect to coastal squeeze effects with habitat loss compensated at Skeffling managed realignment site as part of the wider Humber Flood Risk Management Strategy ("HFRMS") with no additional adverse effects from this project (beyond what has already been assessed as part of the HFRMS). Losses of intertidal as a result of the Project will be *de minimis* in extent (up to 0.0421 ha) and were assessed as not resulting in an AEOI.<br>**Contamination**<br>In relation to water and sediment quality, the potential impacts resulting from the flood defence works (such as increased suspended sediment levels) will be highly localised, temporary and effects on features are considered negligible.<br>In relation to the release of sediment -bound contaminants, prior to excavation of the toe of the revetment sediment samples will be tested in line with OSPAR requirements to minimise the potential for mobilisation of contaminants. In addition, excavation is restricted to within a few metres of the revetment and therefore this is unlikely to result in a cumulative effect.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | H1330. Atlantic salt meadows *(Glauco-Puccinellietalia maritimae)*<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>Physical change to habitats resulting from the deposition of airborne pollutants | **Air Quality**<br>At the nature conservation sensitive saltmarsh habitat potentially impact on by cumulative development and the cumulative development will have some impact from site plant emissions, although such emissions will only be present for a limited period. Operational cumulative impacts at this location (receptor O_E5) account for 1.1% of the annual mean Critical Load for $NO_X$ and 0.4% of the lower Critical Load threshold of nitrogen deposition (0.2% of the upper Critical Load threshold), assuming MARPOL Regulation 13 Tier II emission limits. With Tier III emission limits, impacts account for 0.5% and 0.3% of the Critical Level and Lower Critical Load threshold respectively (0.15% of the upper Critical Load threshold). Thus, the cumulative impact of this cumulative development to Project impacts is minimal.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| | | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis*<br>S1364: Grey seal *Halichoerus grypus*<br>S1365: Harbour seal *Phoca vitulina* | **Disturbance**<br>Disturbance through underwater noise and vibration | Potential underwater noise effects on marine ecology receptors (invertebrates, fish and marine mammals) are expected to be negligible as a result of the revetment project. This is because revetment construction is typically undertaken when the revetment footprint is not inundated with sea water (i.e., remains in the air) which limits underwater noise propagation. Even assuming some noise propagation, the low noise levels associated with this type of coastal defence activity will at worst produce underwater noise levels that will be barely discernible above background conditions and unlikely to cause any behavioural reactions in marine species (even in very close proximity). Underwater noise effects on features as a result of the Project were assessed as not resulting in an AEOI with the proposed mitigation measures in place.<br>The predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 120. | PA/2023/422<br>Phillips 66 Ltd, Eastfield Road.<br>Planning permission for the construction and operation of a post-combustion carbon capture plant, including carbon dioxide compression and metering, cooling equipment, stacks, substations, new and modified services, connections, internal roads, new access onto Eastfield Road, and maintenance and laydown areas (EIA development) | H1330. Atlantic salt meadows *(Glauco-Puccinellietalia maritimae)*<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>Physical change to habitats resulting from the deposition of airborne pollutants | **Air Quality**<br>The operational assessment for the cumulative development shared ecological receptors with the IGET assessment. OE1(d), OE2 and OE10 represent IGET receptors O_E11, O_E12 and O_E17 respectively. At these receptors, the impact of IGET accounted for less than 1% of the Critical Level for NOx and less than the lower Critical Load threshold for N deposition (assuming the more precautionary vessel emissions assumptions). The impact of the Phillips 66 development is also less than 1% of the Critical Level for NOx and the lower Critical Load threshold for N deposition. Based on the impact values reported for the IGET Project and the Phillips 66 development, the combined impact at receptors O_E11 and O_E12 (SAC and SSSI) would amount to around 2% of the Critical Level for NOx and around 0.5% of the Critical Load for N deposition. At receptor O_E17 (LWS), the combined impact would amount to around 1.4% of the Critical Level for NOx and around 0.8% of the Critical Load for N deposition.<br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| All projects | | H1110: Sandbanks which are slightly covered by sea water all the time<br><br>H1130: Estuaries<br><br>H1140: Mudflats and sandflats not covered by seawater at low tide | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss~~/damage~~**<br>With respect to intertidal habitat loss, ~~noting that compensatory habitat will be provided for~~ the ~~Able Marine Energy Park ("AMEP") project and also for indirect losses associated with~~ Project along with the following proposed developments will result in the loss of qualifying intertidal habitat:<br>• AMEP including Material Changes 1 and 2;<br>• Stallingborough Phase 3 Flood Alleviation Scheme (DM/1071/22/FUL~~), all other~~); and<br>• IERRT.<br>The AMEP project will result in a direct loss of intertidal habitat (mudflat and saltmarsh) as a result of the reclamation of the proposed quay (33 ha). Compensation for this loss will be provided at the Cherry Cobb Sands compensation site. Intertidal habitat loss as part of the Stallingborough Phase 3 Flood Alleviation Scheme will be compensated at the Skeffling managed realignment site as part of the wider Humber Flood Risk Management Strategy ("HFRMS").<br>With specific respect to the potential combined intertidal habitat loss as a result of IERRT and the Project, the total loss of intertidal as is anticipated to be 0.0541 ha.. This is based on the combined direct losses due to jetty piling and modelling both schemes together to calculate potential indirect intertidal losses (due to erosion). This combined total intertidal habitat loss represents approximately 0.000148% of the Humber Estuary SAC and approximately 0.000576% of the 'mudflats and sandflats not covered by seawater at low tide' feature of the Humber Estuary SAC.<br>The direct intertidal habitat losses for both IERRT and the Project will not involve a continuous and solid footprint (such as a reclamation) with each pile for both projects instead representing discrete and highly localised point features with large spaces of open mudflat habitat between each of the piles. These patches of mudflat between the piles and also mudflat habitat more widely in the local area will not be altered as a result of the habitat loss. Typical ecological functioning of the mudflat will continue with natural processes associated with maintaining mudflat community composition such as larval dispersal and colonisation not obstructed. As a result, no wider changes in the abundance and diversity of infaunal communities are expected. It should also be noted that no notable differences in key ecological mudflat parameters (such as elevation or sediment type) have ~~intertidal habitats losses~~ been observed around other open piled jetty structures in the Humber region and as such are not predicted for IERRT or the Project.<br>Indirect intertidal loss for both IERRT and the Project consists of very narrow strips on the lower shore around the sublittoral fringe. These predicted losses would be of a similar scale to that ~~are~~ which can occur due to natural background changes in mudflat extent in the local region (e.g., due to seasonal patterns in accretion and erosion or following storm events). Away from the very thin strips of predicted losses, ecological functioning of the mudflat will continue with natural processes associated with maintaining mudflat community composition such as larval dispersal and colonisation not affected. In addition, any changes associated with other ecological parameters important in maintaining mudflat such as sediment type, elevation and sediment deposition will be negligible as a result of the predicted loss.<br>The combined loss of both projects has been considered in the context of the site's conservation objectives as well as the respective targets of these conservation |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | objectives (as provided in the Supplementary Advice on Conservation Objectives (SACOs).<br>The combined loss of direct and indirect intertidal habitat for both IERRT and the Project is *de minimis* in extent and considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SAC/Ramsar site). On this basis any change to the '*extent and distribution of qualifying natural habitats*' conservation objective and associated targets in terms of maintaining '*the presence and spatial distribution of mudflat and sandflat communities*' or restoring '*the total extent, spatial distribution and types of mudflats and sandflats*' is considered ecologically inconsequential~~.~~ both locally and more widely across the Humber Estuary site.<br>A loss on this scale is also considered to be insignificant in terms of '*the structure and function (including typical species) of qualifying natural habitats*' conservation objective. In this respect, the loss is considered to have no material consequences in terms of the '*presence and abundance of key structural and influential species*' target with the combined loss not considered to prevent key species from being a viable component of mudflat habitat in the local area. Furthermore, other targets relating to structure and function in terms of maintaining species composition, sediment composition and Total Organic Carbon (TOC) content in the local area or more widely across the Humber Estuary site will not be altered due to combined habitat loss on this scale.<br>The combined loss is also considered to be insignificant in terms of '*supporting processes on which qualifying natural habitats rely'* conservation objective with any changes to associated targets relating to wave exposure, physico-chemical properties, sediment movement, hydrodynamic regime, sediment quality and water quality parameters considered to be negligible and ecologically inconsequential on mudflat habitat in the Immingham area and more widely across the Humber Estuary site.<br>Therefore, in summary with the provision of the compensatory habitat required for AMEP and the Stallingborough Phase 3 Flood Alleviation Scheme and given that the combined intertidal loss of IERRT and IGET will be *de minimis* and ecologically inconsequential, there is no potential for an AEOI on qualifying interest habitat features as a result of intertidal habitat loss.<br>Subtidal losses are also considered *de minimis* in extent and ecologically inconsequential for all projects.<br>**Habitat change**<br>Potential changes to marine habitats during construction or operation as a result of seabed disturbance (such as due to dredging or marine piling) are considered to be localised, temporary and low magnitude for the Project and all other projects with no direct ~~no~~ spatial overlap of dredge or construction footprints occurring.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Contamination**<br>Water quality effects are anticipated to be localised and temporary for all projects with effects on marine habitats or species considered negligible even when considered cumulatively. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)<br>H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants | A number of projects have been scoped into the in-combination effects assessment for air quality impacts and the assessment has concluded that none will result in AEOI. The detailed AQ modelling undertaken for the Project included specific cumulative effect modelling of the marine vessel and road vehicle emissions for the adjacent IERRT project given the proximity of the two projects, and the potential for cumulative effects to occur in the same part of the Estuary and hence affect the same sensitive receptors. |
| | | S1095: Sea lamprey *Petromyzon marinus*<br>S1099: River lamprey *Lampetra fluviatilis*<br>S1364: Grey seal *Halichoerus grypus*<br>S1365: Harbour seal Phoca vitulina | **Disturbance**<br>• Disturbance through underwater noise and vibration | The key relevant projects that have the potential to result in in-combination effects with the Project through underwater noise and vibration disturbance include:<br>• Maintenance dredge disposal at Grimsby, Immingham and Sunk Dredged Channel (ID 115) (due to dredging);<br>• Humber International Terminal (HIT) berth 2: adaptation for car carriers (ID 94) (due to piling);<br>• AMEP including Material Changes 1 and 2 (ID 25) (due to piling and dredging);<br>• IERRT (ID 22) (due to piling and dredging); and<br>• North Killingholme Power Project (ID 27) (due to piling).<br>**Migratory fish**<br>Underwater noise impacts (on lamprey species ~~and grey seal~~) as a result of the Project along with several other projects have the potential to result in adverse significant effects in migratory fish ~~and marine mammals~~ species. However, there is considered to be no potential for AEOI on qualifying interest features as a result of the Project with the proposed mitigation measures in place. All projects will be subject to similar mitigation measures to avoid the potential for any adverse cumulative underwater noise effects on these features.<br>It is therefore considered a reasonable and robust conclusion that the predicted residual in-combination effects will not compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying migratory fish interest features.<br>**Marine mammals**<br>**Dredging**<br>Underwater noise impacts as a result of the Project along with several other projects have the potential to result in cumulative effects on marine mammal features. In the context of dredging, this is only expected to cause behavioural reactions in a relatively localised area in the vicinity of the dredger for all projects that would not cause a barrier effect. It is therefore concluded that the predicted residual in-combination effects from dredging will not compromise any of the conservation objectives and there is no potential for an AEOI on qualifying marine mammal interest features from dredging activities associated with the Project and other projects.<br>**Piling** |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | Projects involving piling (i.e. HIT Berth 2, AMEP, IERRT and North Killingholme Power Project) have the potential to cause injury effects within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber Estuary.<br><br>*Injury*<br><br>Assuming seals evade the injury effects zone, they are not considered to be at risk of any instantaneous or cumulative injury effects during impact piling across all projects. This risk is further mitigated through the use of soft start piling techniques and marine mammal observers to ensure there are no seals within the vicinity of the works. It is assumed that other projects together with the Project will be subject to these controls to avoid the potential for cumulative and in-combination effects on features of designated sites. Assuming the proposed mitigation measures for other projects and the Project are implemented, the predicted sum of the residual injury effects from all projects in-combination are not considered to compromise any of the conservation objectives, and it is therefore concluded that there is no potential for AEOI on qualifying marine mammal interest features from piling activities.<br><br>*Behaviour*<br><br>Potential behavioural responses and/or displacement effects are primarily limited to the section of the estuary between around Salt End (upstream) and Grimsby to Spurn Bight (downstream) (see Figure 16.1 of ES **[APP-126]**).<br><br>The Spurn on the Outer Humber Estuary and promontory of Grimsby Docks mean that much of the underwater noise generated by percussive piling by all projects will be limited by these hard constraints. This means that noise will not propagate to the outer part of the estuary and beyond and as such will not affect the grey seal breeding colony at Donna Nook. This also leaves expansive areas of the North Sea in which seals can forage, with only a very small percentage of their foraging ranges affected by the projects in-combination. Furthermore, as summarised in Section 1.3 of Appendix A, grey seals can undertake wide ranging seasonal movements over several thousand kilometres. Therefore, seals are likely to be able to exploit a much wider area for foraging during any marine piling activity.<br><br>Similarly, the upstream bend in the estuary at Salt End will mean that elevated underwater noise levels from all projects will not be able to propagate beyond this point. The Humber Estuary upstream of the Project is not known to be used as a breeding site for seals and as highlighted above, the area affected would only represent a very small percentage of their foraging ranges affected by the projects in-combination.<br><br>The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect.<br><br>In addition, any disturbance and barrier to movements caused by the noise during marine piling would be temporary with significant periods during a 24-hour period when no piling will be undertaken. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The actual proportion of marine piling for the Project is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements of marine mammals through the Humber Estuary. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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| | | | | The maximum impact piling scenario for both the Project and IERRT, assuming the construction works overlap, is for up to 7 tubular piles to be installed each day (4 piles for IERRT and 3 piles for the Project) using up to 6 piling rigs driving at any one time (4 piling rigs for IERRT and 2 piling rigs for the Project). If none of the pile driving activity for both projects were to occur at the exact same time and temporally overlap over a 24-hour period, the maximum impact pile driving scenario would involve approximately 80 minutes of vibro piling per day (20 minutes for IERRT and 60 minutes for the Project) and 450 minutes of impact piling per day (180 minutes for IERRT and 270 minutes for the Project).<br><br>Any disturbance and barrier to grey seal movements caused by the noise during piling for the Project and IERRT would be temporary with periods during a 24-hour period when no piling will be undertaken. The proportion of impact piling is estimated to be at worst around 31 % over a 24-hour period (based on 450 minutes of impact piling per day). In other words, any grey seals that remain within the predicted behavioural effects zone at the time of impact piling will be exposed to a maximum of up to 31 % over the period of a day. The proportion of vibro piling is estimated to be at worst around 6 % over a 24- hour period (based on 80 minutes of vibro piling per day). In other words, any grey seals that remain within the predicted behavioural effects zone at the time of piling will be exposed to a total maximum of up to 37 % over the period of a day. In reality, less than 7 piles are likely to be driven per day and also there is likely to be some temporal overlap in the pile driving activity, therefore, the assumptions on maximum pile driving periods and daily exposures are considered to represent a worst case. Piling will also not take place continuously as there will be periods of downtime, pile positioning and set up.<br><br>The same mitigation measures are proposed for both the Project and IERRT to help minimise potential adverse effects (i.e., soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers). In order to take account of any potential in-combination effects should the piling programmes for both projects overlap, it is proposed that the maximum duration of percussive piling permitted within any 4-week period must not exceed a total of 196 hours where any percussive pile drivers for either one or both projects are in operation. Where percussive piling is occurring simultaneously across the two projects these respective time periods will not be double counted as the temporal exposure to this effect is not increased.<br><br>Other projects involving piling (i.e. HIT Berth 2, AMEP and North Killingholme Power Project) will also require similar mitigation to the Project to help minimise or avoid the potential for cumulative and in-combination effects on features of designated sites (such as soft-start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers). It is assumed that other projects together with the Project will be subject to controls by the statutory bodies to avoid the potential for cumulative and in-combination effects on features of designated sites. It should also be noted that for other projects, if there was overlap of marine piling activities with the Project, simultaneous piling would not increase the overall temporal exposure to underwater noise.<br><br>In summary, assuming the proposed mitigation measures for other projects (i.e. HIT Berth 2, AMEP, IERRT and North Killingholme Power Project) and the Project are implemented, the predicted sum of the residual behavioural effects from all projects in-combination are not considered to compromise any of the conservation objectives, and it is therefore concluded that there is no potential for AEOI on qualifying marine mammal interest features, as a result of piling and/or dredging activities. |

| ID | Plan/Project | Features * | Summary of potential effects | Potential for AEOI |
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* All features in the table relate to the Humber Estuary SAC with the exception of S1365: Harbour seal *Phoca vitulina* which is a feature of the and the Wash and North Norfolk Coast SAC.

**Table 37: The potential for an AEOI on qualifying species of the Humber Estuary SPA due to in-combination effects.**

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| 115. | MLA/2014/00431/4<br>Maintenance dredge disposal at Grimsby, Immingham and Sunk Dredged Channel | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | **Disturbance**<br>• Airborne noise and visual disturbance | There is the potential for cumulative effects on birds features if the dredging activities associated with MLA/2014/00431 occur at the same time as construction and maintenance dredging as part of the Project.<br>The noise and visual stimuli associated with MLA/2014/00431 is likely to be similar to the dredging operations for the Project and will be limited due the periodic frequency over the course of a year. Any disturbance responses would be expected to be infrequent, short duration and localised. It is also considered likely that the availability of dredging plant (servicing the ports and approaches across the wider Humber, including Goole, Hull and Grimsby) will mean the potential for dredging to be taking place at adjacent locations and at the same time is limited.<br>Assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 94. | MLA/2020/00520<br>Humber International Terminal (HIT) berth 2: adaptation for car carriers | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | **Disturbance**<br>• Airborne noise and visual disturbance | There is the potential for the Project along with HIT berth 2 works to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore during construction. Data presented as part of the marine licence application for the HIT berth 2 works suggest that waterbirds such as Shelduck, Dunlin, Curlew, Redshank and Black-tailed Godwit are only recorded in very low numbers (typically <10-20 individuals) representing <1% of estuary-wide numbers. Marine piling for the HIT berth 2 works will be short term (two weeks) with only intermittent marine piling activity undertaken each day (several hours per day) during this period. Mild disturbance responses and short-term and localised displacement of the very low numbers of these species present in the vicinity of the HIT project during the works is possible. However, rather than being displaced from the local area completely, birds would be expected to redistribute to nearby foreshore in the Immingham area and continue to feed and roost in these alternative locations following dispersal. Following completion of the construction phase, birds would be expected to return to use the same areas as used prior to construction with any effects considered temporary. In order to reduce potential waterbird disturbance effects associated with the Project a range of mitigation measures are proposed.<br>Assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 25. | TR030001, TR030005 and TR030006<br>Able Marine Energy Park including Material Changes 1 and 2 | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding) | **Habitat loss/damage**<br>• Physical loss of (or change to) habitat and associated species<br>**Disturbance**<br>• Airborne noise and visual disturbance | **Habitat loss/damage**<br>The AMEP project will result in a direct loss of intertidal habitat (mudflat and saltmarsh) as a result of the reclamation of the proposed quay (33 ha). Compensation for this loss will be provided at the Cherry Cobb Sands compensation site. Losses of intertidal as a result of the Project will be de minimis in extent (up to 0.0421 ha) and effects negligible given that the spatial extent of these losses represents a barely measurable and inconsequential reduction in available habitat for waterbird species even at a local scale along the eastern frontage of the port. Therefore, with the provision of the compensatory habitat required for AMEP project, there is no cumulative effect with the |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | Waterbird assemblage | | Project that could compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Disturbance**<br>There is the potential for the AMEP project along with the Project to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore during construction and operation. Mitigation measures for AMEP include a cold weather construction restriction. In addition, compensation for indirect loss of functional intertidal habitat (mudflat and saltmarsh) through disturbance will also be provided at the Cherry Cobb Sands site.<br>Assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects relating to disturbance are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 28. | EN070006<br>Humber Low Carbon Pipelines | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | **Disturbance**<br>• Airborne noise and visual disturbance | Both projects have the potential to cause potential disturbance to waterbirds. Coastal waterbirds using functionally linked land within the footprint of the pipeline corridor could be potentially impacted due to disturbance during construction which could lead to cumulative effects with the Project.<br>Given the current uncertainties with respect to the construction methods and programme for the Humber Low Carbon Pipeline, a detailed assessment of effects on birds which are features of the SPA is not considered possible. However, it is assumed that if required this project will be subject to controls by statutory bodies to avoid the potential for any adverse effects on marine habitats and species such as seasonal restrictions on construction activity. Therefore, assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 29. | EN070008<br>Viking CCS Pipeline | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | **Disturbance**<br>• Airborne noise and visual disturbance | Only the onshore transportation system is being considered as part of the Viking CCS Pipeline DCO application. No marine works are proposed as part of the terrestrial development.<br>Coastal waterbirds using functionally linked land within the footprint of the pipeline corridor could be potentially impacted due to disturbance during construction which could lead to in-combination with the Project.<br>However, with the application of noise fencing for works in proximity to functionally linked land for non-breeding waterbird species, residual effects on these features are not considered to result in an AEOI (Ref 1-224).Therefore, assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 22. | Immingham Eastern Ro-Ro Terminal (IERRT) | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding) | **Habitat loss/damage**<br>• Physical loss of (or change to) habitat and associated species | **Habitat loss/damage**<br>The Project will result in the direct loss of 0.0021 ha (due to the marine piling) and a potential indirect loss of 0.04 ha (due to potential erosion as a result of the presence of the jetty causing changes in currents). The IERRT project, including changes made to application (accepted by the Examining Authority on 6 December 2023) will result in direct loss of 0.012 ha (due to marine piling and capital dredging) and potential indirect loss of 0.02 ha (due to potential erosion of the foreshore). The anticipated total loss of intertidal as a result of the Project and IERRT is anticipated to be 0.0541 ha (based on |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | A162: Common Redshank *Tringa totanus* (Non-breeding)<br><br>Waterbird assemblage | **Disturbance**<br>• Airborne noise and visual disturbance | combined direct losses and modelling both schemes together to calculate potential for indirect intertidal losses). The combined loss of habitat represents approximately 0.000144 % of the Humber Estuary SPA. When considering this is the context of intertidal, the area of loss represents approximately 0.000609 % of intertidal foreshore habitats and approximately 0.000848 % of mudflat within the SPA. The predicted potential indirect intertidal losses for both projects (and direct loss due to capital dredging for IERRT), consist of very narrow strips on the lower shore around the sublittoral fringe. These losses are considered to be of a similar scale to that which can occur due to natural background changes in mudflat extent in the local region (e.g. due to seasonal patterns in accretion and erosion or following storm events).<br><br>Waterbird species could potentially be feeding in the predicted areas of habitat loss (albeit minimal habitat loss as explained above) during low water periods, however, these very small areas remain largely inundated with water and are only uncovered for a very short duration. The direct losses of habitat due to marine piling for both projects will also be highly localised. The spatial extent of these losses represents a barely measurable and inconsequential reduction in available habitat for these mobile species even at a local scale along the eastern frontage of the port. On this basis, any change to prey resources for birds feeding in the local area will be negligible. Individual survival rates or local population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) will not be affected. These *de minimis* changes in mudflat extent are of a magnitude that will not change the overall structure or functioning of the nearby mudflats within the Port of Immingham area or more widely in the Humber Estuary.<br><br>***The potential effects due to changes to waterbird foraging and roosting habitat as a result of the presence of marine infrastructure***<br><br>The approach jetties for both projects will be an open piled structure with large gaps between each of the piles and between the jetty deck and the foreshore seabed (i.e. the mudflat surface). This will minimise the enclosed feel and allow birds feeding near the structure to maintain sightlines. It should be noted that observations from the ornithology surveys in the area suggest that birds regularly feed in very close proximity to both the Eastern Jetty (approximately 1km from the Project) and the Immingham Oil Terminal approach jetty (approximately 500m from the Project) – which are both similar open piled structures - with species such as Redshank, Dunlin, Turnstone regularly recorded underneath jetties and Curlew, Shelduck and Black-tailed Godwit approaching them closely (<10-20m). On this basis, birds would be expected to show similar highly localised responses to structures associated with both projects with responses ranging from no avoidance for some species to potentially some local avoidance (i.e. directly underneath or in close proximity) for other species. As a consequence, any avoidance of marine infrastructure is expected to be limited (and highly localised) and is unlikely to change the overall distribution of waterbird assemblages more widely on the foreshore in the local area.<br><br>***Disturbance***<br><br>There is the potential for the IERRT project along with the Project to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore if disturbing activities associated with each of the construction programmes are being undertaken concurrently. This could reduce the amount of foreshore available with limited disturbance stimuli in the local area. It should be noted that in-combination effects are considered to be limited outside of the winter months due to the very low numbers of SPA qualifying and assemblage species occurring in proximity to the IGET Project during passage and summer months. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | Broadly similar mitigation measures are proposed for both projects in order to minimise potential disturbance. This includes a winter marine construction restriction from 1 October to 31 March (for works within 200m of the foreshore) which will limit potential disturbance over the colder winter months when birds are considered particularly vulnerable to the effects of disturbance. This measure along with the use of acoustic barriers/screens (predicted to reduce noise levels to <70 dB Lmax at distances greater than approximately 200m from the marine piling) and soft start procedures will also help minimise the potential spatial extent of disturbance.<br><br>Therefore, with the application of the proposed mitigation measures, disturbance responses are expected to be limited, both in terms of frequency and the spatial extent of effects with alternative locations in the Immingham area also available for birds to feed and roost. These areas are outside of the zone of influence of potential disturbance including extensive mudflat east of the Project towards the Pyewipe With the proposed winter restriction on construction in place for IERRT, extensive mudflat is also available for feeding west of the IOT jetty for any locally dispersed birds due to the Project. With this measure, birds would be anticipated to have alternative feeding opportunities along the foreshore fronting the Port of Immingham. It should also be noted that approximately 90 and 70 % respectively of the foreshore at low water between the Inner Dock entrance and the IOT (i.e. the mudflat habitat fronting the Port of Immingham) will be at distances of more than 200 m and 300 m respectively from the construction zone.<br><br>Furthermore, ringing data suggests that the local wintering population of Black-tailed Godwits are known to have relatively wide-ranging movements, with flocks frequently moving between alternative feeding sites in the Immingham/Grimsby area. This species is therefore considered to have some plasticity in terms of switching between different sites for feeding compared to some other wader species known to be more site faithful and which utilise smaller wintering ranges.<br><br>On this basis, potential effects on alternative feeding sites are predicted to be limited. Furthermore, following completion of the construction phase, birds would be expected to return to broadly use the same areas as used prior to construction with any effects considered temporary.<br><br>With the proposed mitigation measures, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br><br>There is also the potential for cumulative effects during operation with respect to potential disturbance to waterbirds. Coastal waterbirds are regularly recorded feeding nearby or below port structures such as jetties or pontoons and appear to be relatively tolerant to normal day-to-day port operational activities on existing jetties. Therefore, while there is the potential for some mild and infrequent disturbance occurring near to the approach jetties for both projects, it is expected that birds will become habituated relatively quickly which will limit any longer-term disturbance responses. Given the low anticipated magnitude of potential effects and given the screening is also proposed for the IERRT project on a precautionary basis, potential cumulative effects are not considered to result in an AEOI. |
| 27. | North Killingholme Power Project | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br><br>A149: Dunlin *Calidris alpina alpina* (Non-breeding) | **Disturbance**<br>• Airborne noise and visual disturbance | There is the potential for the Project along with North Killingholme Power Project to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds. However, given the mitigation proposed for both projects which includes soft start procedures and timing restrictions to avoid sensitive periods, it is considered that the impacts are likely to result in mild and localised disturbance responses.. Therefore, |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | | assuming the proposed mitigation measures are followed during construction of both projects, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 102. | DM/1071/22/FUL<br><br>Rock revetment repair and reinforcement along a 4.5km section of the Humber Estuary, works to repair, reinstate and enable access to the gravity outfalls at Middle Drain, Oldfleet Drain and Mawmbridge Drain, associated landscape improvements, installation of temporary construction compounds and associated infrastructure | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | **Habitat loss/damage**<br>• Physical loss of (or change to) habitat and associated species<br>**Disturbance**<br>• Airborne noise and visual disturbance | **Habitat loss/damage**<br>The coastal defence project will result in a permanent loss of 0.25 ha of intertidal habitat in 11 discrete narrow strips averaging 227 m², of which the largest is no more than 10m wide and 30m long. These discrete areas of mudflat loss along the revetment are distanced roughly 100m apart. The Shadow HRA undertaken for the project concluded that '*within the Pyewipe area, there is approximately 300 ha of this Annex 1 habitat, being over 700 m at its widest extent to the south. Therefore, the loss of 0.25 ha equates to a loss of 0.08% of the total mudflats within Pyewipe. The loss of these small and discrete parcels of mudflat along the base of the existing revetment is not considered to adversely affect the function of the mudflats as a self-sustaining habitat within the Pyewipe area. This impact is considered to be ecologically inconsequential to the Humber Estuary SAC and so not adversely affecting the integrity of the site. As the impact is considered to be ecologically inconsequential, it is not considered to frustrate the conservation objective of restore the total extent. No adverse effect on the site integrity of the Humber Estuary SAC is anticipated as a result of loss of habitat constituting the qualifying feature of mudflats and sandflats not covered by seawater at high tide associated with construction of rock armour revetment*'. It should also be noted that indirect loss could also occur with respect to coastal squeeze effects with habitat loss compensated at Skeffling managed realignment site as part of the wider Humber Flood Risk Management Strategy ("HFRMS") with no additional adverse effects from this project (beyond what has already been assessed as part of the HFRMS). Losses of intertidal as a result of the Project will be de minimis in extent (up to 0.0421 ha) and effects considered negligible given the spatial extent of these losses represents a barely measurable and inconsequential reduction in available habitat for waterbird species even at a local scale along the eastern frontage of the port.<br>**Disturbance**<br>There is the potential for the Project along with the flood defence works to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore if disturbing activities associated with each of the construction programmes are being undertaken concurrently. This could reduce the amount of foreshore available with limited disturbance stimuli in the local area. It should be noted that in-combination effects are considered to be limited outside of the winter months due to the very low numbers of SPA qualifying and assemblage species occurring in proximity to the IGET Project during passage and summer months. Furthermore, the flood defence works will not be undertaken during the winter period (between October and March) which will help minimise potential disturbance effects associated with this project. In order to reduce potential waterbird disturbance effects associated with the Project a range of mitigation measures are proposed. With the proposed mitigation in place for the Project, Black-tailed Godwit and other birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area). |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | If any of these infrequent local flights do occur there is still considered extensive areas of mudflat available in the local area. As the Environment Agency Stallingborough 3 flood risk management scheme will not be undertaken during the winter period (between October and March), any locally dispersed birds will have extensive areas of mudflat east of the Project towards the Pyewipe Mudflat available during the key wintering period.<br>Furthermore, ringing data suggests that the local wintering population of Black-tailed Godwits are known to have a relatively wide-ranging movements, with flocks frequently moving between alternative feeding sites in the Immingham/Grimsby area. This species is therefore considered to have some plasticity in terms of switching between different sites for feeding compared to some other wader species known to be more site faithful and which utilise smaller wintering ranges.<br>On this basis, potential effects on alternative feeding sites are predicted to be limited.<br>Furthermore, it is anticipated that majority of the Environment Agency Stallingborough 3 flood risk management will be completed by October 2024 and therefore limited temporal overlap between both of the works will occur. With the proposed mitigation, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 136. | ~~Immingham Onshore Wind~~ DM/0329/24/FUL<br>Erection of one wind turbine (T2), measuring up to 149.9m to blade tip height. Associated ancillary infrastructure to include access tracks, hardstanding areas for the turbine location, electrical infrastructure, drainage works, temporary laydown areas, temporary construction compound and associated works | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A143: Red Knot (Non-breeding) *Calidris canutus*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A157: Bar-tailed Godwit (Non-breeding) *Limosa lapponica*<br>A162: Common Redshank *Tringa totanus* (Non-breeding)<br>Waterbird assemblage | **Disturbance**<br>• Airborne noise and visual disturbance<br>**Collision Risk** | There is the potential for the onshore turbine project to cause displacement effects to SPA coastal waterbird features as well as a collision risk. However, based on the latest scheme design, the turbine locations are too distant from the foreshore and from any associated functionally linked land to cause displacement effects in waterbird species (based on a detailed review of the zone of influence of potential turbine displacement effects). In addition, collision risk modelling based on established methods and industry guidance predicts potential collision rates will be very low for all SPA waterbird species and will not cause population level effects. Therefore, assuming the proposed mitigation measures for the Project are implemented, the residual predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | All projects | A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>A162: Common Redshank *Tringa totanus* (Non-breeding) | **Habitat loss/damage**<br>• Physical loss of (or change to) habitat and associated species. Physical change to habitats resulting from the deposition of airborne pollutants<br>**Disturbance**<br>• Airborne noise and visual disturbance | **Habitat loss/damage**<br>With respect to intertidal habitat loss for coastal waterbirds, on the basis that compensatory habitat will be provided for the Able Marine Energy Park (AMEP project) and also for indirect losses associated with the Stallingborough Phase 3 Flood Alleviation Scheme (DM/1071/22/FUL), all other projects have intertidal habitats losses that are considered de minimis in extent and ecologically inconsequential. On this basis, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | Waterbird assemblage | | A number of projects have been scoped into the in-combination effects assessment for air quality impacts due to the potential for changes in air quality a to occur in the same part of the Estuary and hence affect the same sensitive receptors. The assessment has concluded that none will result in AEOI either alone or in-combination with any other plans or projects.<br>**Disturbance**<br>Potential noise and visual disturbance impacts during construction as a result of the Project along with several other projects have the potential to result in potential disturbance to coastal waterbirds. It should be noted that in-combination effects are considered to be limited outside of the winter months due to the very low numbers of SPA qualifying and assemblage species occurring in proximity to the IGET Project during passage and summer months. With the proposed mitigation in place for the Project, wintering Black-tailed Godwit and other birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area).<br>If any of these infrequent local flights do occur there is still considered extensive areas of mudflat available in the local area available even if both the nearby Environment Agency Stallingborough 3 flood risk management scheme and IERRT project may be taking place at the same time as the Project.<br>With respect to the Environment Agency Stallingborough 3 flood risk management scheme, the flood defence works will not be undertaken during the winter period (between October and March). On this basis, any locally dispersed birds will have extensive areas of mudflat east of the Project towards the Pyewipe Mudflat available during the key wintering period.<br>With respect to IERRT, with the proposed winter restriction on construction in place (from 1 October to 31 March on activity including piling within 200 m of exposed foreshore), extensive mudflat is also available for feeding west of the IOT jetty for any locally dispersed birds due to the Project. With this measure, birds would be anticipated to have alternative feeding opportunities along the foreshore fronting the Port of Immingham. It should also be noted that approximately 90 and 70 % respectively of the foreshore at low water between the Inner Dock entrance and the IOT (i.e. the mudflat habitat fronting the Port of Immingham) will be at distances of more than 200 m and 300 m respectively from the construction zone.<br>Furthermore, ringing data suggests that the local wintering population of Black-tailed Godwits are known to have a relatively wide-ranging movements, with flocks frequently moving between alternative feeding sites in the Immingham/Grimsby area. This species is therefore considered to have some plasticity in terms of switching between different sites for feeding compared to some other wader species known to be more site faithful and which utilise smaller wintering ranges.<br>On this basis, potential effects on alternative feeding sites are predicted to be limited.<br>Therefore, with the proposed mitigation required for each project there is considered to be no potential for AEOI on qualifying interest features. Furthermore, it is anticipated that majority of the Environment Agency Stallingborough 3 flood risk management will be completed by October 2024 and therefore limited temporal overlap between both of the works will occur.<br>It is therefore considered a reasonable and robust conclusion that the predicted residual in-combination effects will not compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |

**Table 38: The potential for an AEOI on qualifying habitats and species of the Humber Ramsar due to in-combination effects.**

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| 115. | MLA/2014/00431/4<br>Maintenance dredge disposal at Grimsby, Immingham and Sunk Dredged Channel | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | **Habitat loss/damage**<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss/damage**<br>The habitats in the area are already subject to considerable seabed disturbance as a result of the existing maintenance dredging regime. The variations proposed to this existing maintenance dredge licence will not change the volumes of material to be dredged from the Port of Immingham area. The marine habitats and species occurring in the area are also considered to be commonly occurring and of low conservation value. Changes during dredging as a result of the Project are considered to be localised and of low magnitude and in-combination with this maintenance dredging project will result in only a very small increase in the potential maintenance dredge commitment for the Immingham area and disposal site.<br>There is the potential for cumulative effects on local air quality. Activities associated with MLA/2014/00431 may have emissions to air that could coincide with proposed IGET emissions and effect shared receptors. Due to the location of MLA/2014/00431 emission sources, shared receptors are limited to air quality sensitive habitats within the Humber Estuary Ramsar, namely the closet areas of saltmarsh.<br>The proposed Project does not impact on the nearest saltmarsh habitats to the extent that the effect is significant. Any emissions associated with MLA/2014/00431 will be limited due to the number of emission sources and intermittent operation of those sources over the course of a year.<br>**Contamination**<br>The physical processes assessment of the Project indicates a negligible future maintenance dredge requirement for the IGET berths. Similarly to the existing adjacent berths at IOT, the flow regime within the berth pocket is considered sufficient to keep the bed generally swept clear of deposited material. Some limited accretion is predicted underneath the IGET jetty head and, should this accrete sufficiently to spill over into the berth pocket, some very limited future maintenance dredge may be required. If it is, however, this is likely to be very infrequent (years between campaigns) and for a very small volume of material (considerably lower than the initial capital dredge). For completeness, the following assessment considers the potential for cumulative effects with respect to increased SSC as a result of the possible limited maintenance dredging and disposal of material from IGET alongside the existing disposals from Grimsby, Immingham, and Sunk Dredged Channel.<br>The assessment of the potential future maintenance dredging requirements for the Project indicates a negligible future maintenance dredge requirement. In-combination effects from dredge or disposal plumes from adjacent sites will only exist for a short period of time (a matter of hours) when activities are taking place concurrently. Once the next peak tide (ebb or flood) has dispersed the plume across the wider study area, the increased SSC values are unlikely to be distinguishable from the existing background concentrations. It is also considered likely that the availability of dredging plant (servicing the ports and approaches across the wider Humber, including Goole, Hull and Grimsby) will mean the potential for dredging to be taking place at adjacent locations and at the same time is limited.<br>In relation to the release of sediment -bound contaminants, the Marine Licence requires sediment samples to be tested in line with OSPAR requirements prior to disposal which minimises the potential for mobilisation of contaminants. In addition, the Project is concerned with the disposal of recently accreted sediment which is less likely to comprise a source of historic contamination and therefore this is unlikely to result in a cumulative effect.<br>Considering all pathways, and the very limited potential (in terms of frequency and volume) for any maintenance dredge requirement for the Project, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | **Disturbance**<br>• Airborne noise and visual disturbance | There is the potential for cumulative effects on birds features if the dredging activities associated with MLA/2014/00431 occur at the same time as construction and maintenance dredging as part of the Project.<br>The noise and visual stimuli associated with MLA/2014/00431 is likely to be similar to the dredging operations for IGET and will be limited due the periodic frequency over the course of a year. Any disturbance responses would be expected to be infrequent, short duration and localised. It is also considered likely that the availability of dredging plant (servicing the ports and approaches across the wider Humber, including Goole, Hull and Grimsby) will mean the potential for dredging to be taking place at adjacent locations and at the same time is limited.<br>Assuming the proposed mitigation measures for the Project are implemented, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |
| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | **Disturbance**<br>• Disturbance through underwater noise and vibration | There is the potential for cumulative effects on lamprey and grey seal features if the dredging activities associated with MLA/2014/00431 occur at the same time as construction and maintenance dredging as part of the Project.<br>The noise associated with MLA/2014/00431 is likely to be similar to the dredging operations for the Project and will be limited due the intermittent operation over the course of a year. It is also considered likely that the availability of dredging plant (servicing the ports and approaches across the wider Humber, including Goole, Hull and Grimsby) will mean the potential for dredging to be taking place at adjacent locations and at the same time is limited.<br>However, dredging for both projects is only expected to cause behavioural reactions (at most) in a relatively localised area in the vicinity of the dredger. Therefore, assuming the proposed mitigation measures for the Project are implemented, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | |
| 94. | MLA/2020/00520<br>Humber International Terminal (HIT) berth 2: adaptation for car carriers | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in | **Habitat loss/damage**<br>The piles required for the HIT berth 2 works will result in a *de minimis* loss of subtidal habitat. In addition, sedimentation due to the localised resuspension of sediment as a result of seabed disturbance during marine piling and changes to hydrodynamic and sedimentary processes due to the presence of the piles including potential scouring directly around piles effects are anticipated to be negligible and highly localised. Furthermore, the benthic community is expected to recover relatively rapidly from any localised physical disturbance with subtidal species known to occur in the area typically considered fast growing and/or have rapid reproductive rates. The cumulative effects of physical loss of habitat are considered negligible.<br>**Contamination**<br>In relation to water and sediment quality, there is the potential for cumulative effects with respect to increased SSC and changes to dissolved oxygen and chemical water quality as a result of seabed disturbance during marine piling. Any changes would cause highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) and the effects are considered negligible on features for both projects. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | sediments, and accidental oil, fuel or chemical releases | Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | **Disturbance**<br>• Airborne noise and visual disturbance | There is the potential for the Project along with HIT berth 2 works to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore during construction. Data presented as part of the marine licence application for the HIT berth 2 works suggest that waterbirds such as Shelduck, Dunlin, Curlew, Redshank and Black-tailed Godwit are only recorded in very low numbers (typically <10-20 individuals) representing <1% of estuary-wide numbers. Marine piling for the HIT berth 2 works will be short term (two weeks) with only intermittent marine piling activity undertaken each day (several hours per day) during this period. Mild disturbance responses and short-term and localised displacement of the very low numbers of these species present in the vicinity of the HIT project during the works is possible. However, rather than being displaced from the local area completely, birds would be expected to redistribute to nearby foreshore in the Immingham area and continue to feed and roost in these alternative locations following dispersal. Following completion of the construction phase, birds would be expected to return to use the same areas as used prior to construction with any effects considered temporary. In order to reduce potential waterbird disturbance effects associated with the Project a range of mitigation measures are proposed.<br>Assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |
| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | **Disturbance**<br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the Project along with HIT berth 2 works have the potential to result in cumulative effects on lamprey and grey seal features of the Humber Estuary Ramsar. Marine piling noise has the potential to cause injury effects in fish and marine mammals within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber Estuary for both projects. Any barrier to movements caused by the noise during piling for the Project would be temporary with significant periods during a 24-hour period when no piling will be undertaken (the actual proportion of marine piling is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements of marine mammals through the Humber Estuary. Piling noise will take place for a small amount of time each day over a period of approximately 343 days. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect. Both projects will require similar mitigation to help minimise potential adverse effects (such as soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers).<br>It is assumed that both projects will be subject to controls by the statutory bodies to avoid the potential for cumulative and in-combination effects on features of designated sites. Therefore, assuming the proposed mitigation measures for both projects are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | |
| 25. | Able Marine Energy Park (AMEP) DCO as consented and Material Change 1 and 2 | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, | H**abitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat | **Habitat loss/damage**<br>Both the AMEP and the Project have the potential to result in changes to marine habitats as a result of capital dredging due to physical disturbance during sediment removal, sediment deposition and indirectly as a result of changes to hydrodynamic and sedimentary processes. These potential effects were assessed as not resulting in an AEOI for both projects. The subtidal habitats around the Port of Immingham are typically impoverished and of low ecological value reflecting the existing high levels of physical disturbance in the area due to strong near bed tidal currents and sediment transport. Deposition of sediment as a result of dredging for both projects was predicted to be localised and |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | saltmarshes, and coastal brackish/saline lagoons. | • Physical loss of (or change to) habitat and associated species<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | similar to background variability away from the dredge pockets with species occurring in the local area considered tolerant to some sediment deposition. The cumulative effects of change on marine habitats and species from the highly localised and small scale predicted effects due to hydrodynamic and sedimentary processes are considered negligible.<br>The AMEP project will result in a direct loss of intertidal habitat (mudflat and saltmarsh) as a result of the reclamation of the proposed quay (33 ha). Compensation for this loss will be provided at the Cherry Cobb Sands compensation site. Direct and indirect loss of intertidal as a result of the Project will be de minimis (up to 0.0421 ha) and not considered to result in an AEOI. Therefore, with the provision of the compensatory habitat required for AMEP, there is no cumulative effect taking account of the Project that could compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>With respect to airborne pollutants, the traffic data used to inform the air quality assessment for the proposed IGET project is inherently cumulative with regards to the Consent Order for the AMEP. There are no predicted in-combination effects and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Contamination**<br>In relation to water and sediment quality, there is the potential for cumulative effects with respect to increased SSC and changes to dissolved oxygen and chemical water quality as a result of seabed disturbance. Any changes would cause localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) and the effects are considered negligible on features.<br>In relation to the release of sediment -bound contaminants, the level of contamination in the proposed dredge areas for both projects was considered to be low with material expected be rapidly dispersed by strong tidal currents in the area.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | **Habitat loss/damage**<br>• Physical loss of (or change to) habitat and associated species<br>**Disturbance**<br>• Airborne noise and visual disturbance | **Habitat loss/damage**<br>The AMEP project will result in a direct loss of intertidal habitat (mudflat and saltmarsh) as a result of the reclamation of the proposed quay (33 ha). Compensation for this loss will be provided at the Cherry Cobb Sands compensation site. Losses of intertidal as a result of the proposed Project will be de minimis in extent (up to 0.0421 ha) and effects negligible given that the spatial extent of these losses represents a barely measurable and inconsequential reduction in available habitat for waterbird species even at a local scale along the eastern frontage of the port. Therefore, with the provision of the compensatory habitat required for AMEP project, there is no additional cumulative effect from the Project that could compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Disturbance**<br>There is the potential for the AMEP project along with the Project to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore during construction and operation. Mitigation measures for AMEP include a cold weather construction restriction. In addition, compensation for indirect loss of functional intertidal habitat (mudflat and saltmarsh) through disturbance will also be provided at the Cherry Cobb Sands site.<br>Assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects relating to disturbance are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | **Disturbance**<br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the Project along with the AMEP works have the potential to result in cumulative effects on lamprey and grey seal features of the Humber Estuary Ramsar. Dredging for both projects is only expected to cause behavioural reactions in a relatively localised area in the vicinity of the dredger for both fish and marine mammals. Marine piling noise has the potential to cause injury effects in fish and marine mammals within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber Estuary for both projects. Any barrier to movements caused by the noise during piling for the Project would be temporary with significant periods during a 24-hour period when no piling will be undertaken (the actual proportion of marine piling is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements of marine mammals through the Humber Estuary. Piling noise will take place for a small amount of time each day over a period of approximately 343 days. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect. Both projects will require similar mitigation to help minimise potential adverse effects (such as soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers).<br>It is assumed that both projects will be subject to controls by the statutory bodies to avoid the potential for cumulative and in-combination effects on features of designated sites. Therefore, assuming the proposed mitigation measures for both projects are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | |
| 28. | EN070006<br>Humber Low Carbon Pipelines | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | Based on information provided in the EIA scoping report for the Humber Low Carbon Project, trenchless methods (e.g., bored tunnel) could be used to minimise potential effects on SAC habitats where the pipelines cross the Humber Estuary. However, construction method has not been confirmed at the landfall (trenchless, e.g., HDD, or via cofferdam) and, therefore, features of the SAC could not be scoped out.<br>Given the current uncertainties with respect to the construction methods and programme for the Humber Low Carbon Pipeline, a detailed assessment of effects on SAC features is not considered possible. However, it is assumed that if required this project will be subject to controls by statutory bodies to avoid the potential for any adverse effects on Ramsar features. Therefore, assuming the proposed mitigation measures are followed for the Project, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and a conclusion of no AEOI can be reached, subject to further information becoming available**.** |
| | | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | **Disturbance**<br>• Airborne noise and visual disturbance | Both projects have the potential to cause potential disturbance to waterbirds. Coastal waterbirds using functionally linked land within the footprint of the pipeline corridor could be potentially impacted due to disturbance during construction which could lead to cumulative effects with the Project.<br>Given the current uncertainties with respect to the construction methods and programme for the Humber Low Carbon Pipeline, a detailed assessment of effects on birds which are features of the Ramsar is not considered possible. However, it is assumed that if required this project will be subject to controls by statutory bodies to avoid the potential for any adverse effects on marine habitats and species. Therefore, assuming the proposed mitigation measures for the Project are implemented, the |
| | | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: | | |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
|---|---|---|---|---|
| | | Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | **Disturbance**<br>• Disturbance through underwater noise and vibration | Given the current uncertainties with respect to the construction methods and programme for the Humber Low Carbon Pipeline, a detailed assessment of underwater noise and vibration effects on Ramsar features is not considered possible. However, it is assumed that if required this project will be subject to controls by statutory bodies to avoid the potential for any adverse cumulative effects on Ramsar features. Therefore, assuming the proposed mitigation measures are followed for the Project, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and a conclusion of no AEOI can be reached, subject to further information becoming available. |
| | | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | |
| 29. | EN070008<br>Viking CCS Pipeline | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | **Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases<br>• **Disturbance**<br>• Disturbance through underwater noise and vibration | Only the onshore transportation system is being considered as part of the Viking CCS Pipeline DCO application. No marine works are proposed as part of the terrestrial development. In addition, in-combination air quality effects are anticipated since no construction vehicles associated with that project will travel within 200m of any European site and there are no operational emissions. However, there is considered the potential for effects on river lamprey (which migrate through the estuary and are a qualifying feature of the Humber Estuary SAC/Ramsar).<br>Watercourses which will be crossed by the proposed Viking CCS Pipeline have the potential to support river lamprey. Smaller watercourses will be crossed using open cut techniques. There is a low risk of direct mortality and / or injury to river lamprey as a result of open-cut crossing methodologies. There is also a risk of noise and vibration impacts on lamprey from drilling techniques particularly if carried out during spawning or migration periods. There is potential risk of indirect impacts from surface runoff from constructions areas (i.e., fine sediments) and impacts on water quality from potential pollution incidents (i.e. chemical spills) thereby having potential effects on aquatic species where there are requirements for works taking place above or in proximity to aquatic habitats. There is also a potential indirect impact from light pollution if lighting used during the construction phase is shining directly on water bodies. However, a wide range of mitigation measures outlined in the CEMP are proposed (Ref 1-223; Ref 1-224).<br>On this basis, with the application of the mitigation proposed for the Viking CCS Pipeline and the mitigation measures proposed for the Project for lamprey species (to minimise underwater noise effects during piling such as soft starts and seasonal restrictions), predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on the river lamprey feature. |
| | | Criterion 5 – Bird Assemblages of International Importance: | **Disturbance** | The onshore  transportation system only is being considered as part of the Viking CCS Pipeline DCO application. No marine works are proposed as part of the terrestrial development. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | • Airborne noise and visual disturbance | Coastal waterbirds using functionally linked land within the footprint of the pipeline corridor could be potentially impacted due to disturbance during construction which could lead to in-combination with the Project.<br>However, with the application of noise fencing for works in proximity to functionally linked land for non-breeding waterbird species, residual effects on these features are not considered to result in an AEOI (Ref 1-224).Therefore, assuming the proposed mitigation measures for the Project are implemented, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |
| 22. | Immingham Eastern Ro-Ro Terminal (IERRT) | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss/damage**<br>*Intertidal habitat loss*<br>The Project will result in the direct loss of 0.0021 ha (due to the marine piling) and a potential indirect loss of 0.04 ha (due to potential erosion as a result of the presence of the jetty causing changes in currents). The IERRT project, including changes made to application (accepted by the ExA on 6 December 2023) will result in direct loss of 0.012 ha (due to marine piling and capital dredging) and potential indirect loss of 0.02 ha (due to potential erosion of the foreshore). The anticipated total loss of intertidal as a result of the Project and IERRT is anticipated to be 0.0541 ha (based on combined direct losses and modelling both schemes together to calculate potential for indirect intertidal losses). The combined loss of habitat represents approximately 0.000144 % of the Humber Estuary SPA/Ramsar. When considering this is the context of intertidal, the area of loss represents approximately 0.000609 % of intertidal foreshore habitats and approximately 0.000848 % of mudflat within the SPA. The predicted potential indirect intertidal losses for both projects (and direct loss due to capital dredging for IERRT), consist of very narrow strips on the lower shore around the sublittoral fringe. These losses are considered to be of a similar scale to that which can occur due to natural background changes in mudflat extent in the local region (e.g. due to seasonal patterns in accretion and erosion or following storm events). These de minimis changes in mudflat extent are of a magnitude that will not change the overall structure or functioning of the nearby mudflats within the Port of Immingham area or more widely in the Humber Estuary.<br>*Subtidal habitat loss*<br>Marine piling will result in a direct loss of 0.059 ha and 0.032 ha of seabed habitat for the Project and IERRT respectively. This combined habitat loss of 0.091 ha represents approximately 0.000248 % of the Humber Estuary Ramsar. The combined loss in subtidal habitat as a result of the piles is considered negligible in the context of the extent of the overall amount of similar marine habitats found locally in the Humber Estuary. All the species recorded were considered commonly occurring and not protected. Furthermore, faunal assemblage recorded during project specific benthic surveys for both projects are also considered characteristic of subtidal habitats found more widely in this section of the Humber Estuary. Localised losses of this magnitude are also not considered to adversely affect the overall functioning of subtidal habitats within this section of the Humber Estuary.<br>**Physical damage through disturbance and/or smothering of habitat**<br>Capital dredging for the Project will remove 4,000m³ of material over a maximum area of approximately 10,000m² (with the capital dredge for IERRT removing approximately 190,000m³ of material over a maximum area of approximately 70,000m²). For both projects following dredging, it is considered likely that the dredge pocket would provide similar substrate for infaunal colonisation to that under pre-dredge conditions which would then be expected to be recolonised by a similar assemblage to baseline conditions. In addition, sedimentation as a result of capital dredging for both projects is predicted to be highly localised and similar to background variability. Species recorded in both dredge footprint areas are considered tolerant to the predicted millimetric changes in deposition and therefore smothering |

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| | | | | effects as considered unlikely. In addition, the species recorded in the benthic invertebrate surveys are fast growing and/or have rapid reproductive rates which allow populations to fully re-establish in typically less than one to two years and for some species within a few months.<br><br>For the Project, maintenance dredging is expected to be very limited (if required at all). As a result, any dredging that is required will only be undertaken very periodically (frequency will be dictated by operational requirements but is anticipated there could be several years or more between maintenance dredge campaigns). For the IERRT project, regular maintenance dredging (i.e. occurring every 3-4 months) is anticipated to be restricted to a relatively small proportion of the total maintenance dredge area (i.e. focused around the finger pier piles and adjacent areas of the berth pockets and pontoons). The remainder of the area will only be required to be dredged much more periodically (frequency in these areas will be dictated by operational requirements but is anticipated to be approximately every 1-2 years or more). In both areas, a generally impoverished benthic community was recorded in the dredge footprint which is likely to reflect the existing high levels of physical disturbance in the area due to strong near bed tidal currents and sediment transport with infaunal populations anticipated to fully re-establish in between several months and 1-2 years. On this basis, given the expected frequency of dredging, a comparable macrofaunal community to pre dredge conditions would be expected to occur over much of both the maintenance dredging footprints.<br><br>**Contamination**<br><br>The resuspension of sediment as a result of seabed disturbance during marine piling and capital dredging for both projects will cause highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen) with potential effects on features considered to be negligible.<br><br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl – 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br><br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | **Habitat loss/damage**<br><br>• Physical loss of (or change to) habitat and associated species<br><br>**Disturbance**<br><br>• Airborne noise and visual disturbance | **Habitat loss/damage**<br><br>*Intertidal habitat loss*<br><br>The Project will result in the direct loss of 0.0021 ha (due to the marine piling) and a potential indirect loss of 0.04 ha (due to potential erosion as a result of the presence of the jetty causing changes in currents). The IERRT project, including changes made to application (accepted by the ExA on 6 December 2023) will result in direct loss of 0.012 ha (due to marine piling and capital dredging) and potential indirect loss of 0.02 ha (due to potential erosion of the foreshore). The anticipated total loss of intertidal as a result of the Project and IERRT is anticipated to be 0.0541 ha (based on combined direct losses and modelling both schemes together to calculate potential for indirect intertidal losses). The combined loss of habitat represents approximately 0.000144 % of the Humber Estuary Ramsar. When considering this is the context of intertidal, the area of loss represents approximately 0.000609 % of intertidal foreshore habitats and approximately 0.000848 % of mudflat within the Ramsar. The predicted potential indirect intertidal losses for both projects (and direct loss due to capital dredging for IERRT), consist of very narrow strips on the lower shore around the sublittoral fringe. These losses are considered to be of a similar scale to that which can occur due to natural background changes in mudflat extent in the local region (e.g. due to seasonal patterns in accretion and erosion or following storm events). Waterbird species could potentially be feeding in the predicted areas of habitat loss (albeit minimal habitat loss as explained above) during low water periods, these very small areas remain largely inundated with water and are only uncovered for a very short duration. The direct losses of habitat due to marine piling for both projects will also be highly localised. The spatial extent of these losses represents a barely measurable and inconsequential reduction in available habitat for these mobile species even at a local scale along the eastern frontage of the port. On this basis, any change to prey resources for birds feeding in the local area will be negligible. Individual survival rates or local |

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| | | | | population levels (either directly through mortality or due to birds dispersing to new feeding areas in other areas of the Humber Estuary) will not be affected. These *de minimis* changes in mudflat extent are of a magnitude that will not change the overall structure or functioning of the nearby mudflats within the Port of Immingham area or more widely in the Humber Estuary.<br>***The potential effects due to changes to waterbird foraging and roosting habitat as a result of the presence of marine infrastructure***<br>The approach jetties for both projects will be an open piled structure with large gaps between each of the piles and between the jetty deck and the foreshore seabed (i.e. the mudflat surface). This will minimise the enclosed feel and allow birds feeding near the structure to maintain sightlines. It should be noted that observations from the ornithology surveys in the area suggest that birds regularly feed in very close proximity to both the Eastern Jetty (approximately 1km from the Project) and the Immingham Oil Terminal approach jetty (approximately 500m from the Project) – which are both similar open piled structures - with species such as Redshank, Dunlin, Turnstone regularly recorded underneath jetties and Curlew, Shelduck and Black-tailed Godwit approaching them closely (<10-20m). On this basis, birds would be expected to show similar highly localised responses to structures associated with both projects with responses ranging from no avoidance for some species to potentially some local avoidance (i.e. directly underneath or in close proximity) for other species. As a consequence, any avoidance of marine infrastructure is expected to be limited (and highly localised) and is unlikely to change the overall distribution of waterbird assemblages more widely on the foreshore in the local area.<br>***Disturbance***<br>There is the potential for the IERRT project along with the Project to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore if disturbing activities associated with each of the construction programmes are being undertaken concurrently. This could reduce the amount of foreshore available with limited disturbance stimuli in the local area. It should be noted that in-combination effects are considered to be limited outside of the winter months due to the very low numbers of SPA qualifying and assemblage species occurring in proximity to the IGET Project during passage and summer months.<br>Broadly similar mitigation measures are proposed for both projects in order to minimise potential disturbance. This includes a winter marine construction restriction from 1 October to 31 March (for works within 200m of mudflat) which will limit potential disturbance over the colder winter months when birds are considered particularly vulnerable to the effects of disturbance. This measure along with the use of acoustic barriers/screens (predicted to reduce noise levels to <70 dB Lmax at distances greater than approximately 200m from the marine piling) and soft start procedures will also help minimise the potential spatial extent of disturbance.<br>Therefore, with the application of the proposed mitigation measures, disturbance responses are expected to be limited, both in terms of frequency and the spatial extent of effects with alternative locations in the Immingham area are available to birds to feed and roost. These areas will be outside of the zone of influence of potential disturbance including extensive mudflat east of the Project towards the Pyewipe. With the proposed winter restriction on construction in place for IERRT, extensive mudflat is also available for feeding west of the IOT jetty for any locally dispersed birds due to the Project. With this measure, birds would be anticipated to have alternative feeding opportunities along the foreshore fronting the Port of Immingham. It should also be noted that approximately 90 and 70 % respectively of the foreshore at low water between the Inner Dock entrance and the IOT (i.e. the mudflat habitat fronting the Port of Immingham) will be at distances of more than 200 m and 300 m respectively from the construction zone.<br>Furthermore, ringing data suggests that the local wintering population of Black-tailed Godwits are known to have a relatively wide-ranging movements, with flocks frequently moving between alternative feeding sites in the Immingham/Grimsby area. This species is therefore considered to have some plasticity in terms of switching between different sites for feeding compared to some other wader species known to be more site faithful and which utilise smaller wintering ranges. |

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| | | | | On this basis, potential effects on alternative feeding sites are predicted to be limited.. Furthermore, following completion of the construction phase, birds would be expected to return to broadly use the same areas as used prior to construction with any effects considered temporary.<br><br>With the proposed mitigation measures, the residual predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br><br>There is also the potential for cumulative effects during operation with respect to potential disturbance to waterbirds. Coastal waterbirds are regularly recorded feeding nearby or below port structures such as jetties or pontoons and appear to be relatively tolerant to normal day-to-day port operational activities on existing jetties. Therefore, while there is the potential for some mild and infrequent disturbance occurring near to the approach jetties for both projects, it is expected that birds will become habituated relatively quickly which will limit any longer-term disturbance responses. Given the low anticipated magnitude of potential effects and given the screening is also proposed for the IERRT project on a precautionary basis, potential cumulative effects are not considered to result in an AEOI. |
| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br><br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast.<br><br>Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br><br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | **Disturbance**<br><br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the Project along with the IERRT project have the potential to result in cumulative effects on lamprey and grey seal features of the Humber Estuary Ramsar. Dredging for both projects is only expected to cause behavioural reactions in a relatively localised area in the vicinity of the dredger for both fish and marine mammals.<br><br>Piling noise has the potential to cause injury effects in fish and marine mammals within close proximity to the piling activity and strong behavioural responses over a wider area of the Humber estuary for both projects. Lamprey form part of the least sensitive noise hearing fish group according to the Popper *et al*. (2014) guidelines and the predicted zone of behavioural effects are based on the sound levels to which schools of sprat, which are in the highest sensitive noise hearing fish group, responded on 50% of observations (Hawkins *et al*., 2014). The predicted behavioural zone is therefore considered overly precautionary and conservative and is likely to be a more localised area for lamprey. Instantaneous peak Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) effects in grey seal are predicted to occur within close proximity to the impact piling activity and cumulative SEL PTS and TTS effects are predicted over a wider area. Assuming seals evade the injury effects zone, they are not considered to be at risk of any instantaneous or cumulative injury effects during impact piling. Strong behavioural responses may occur over a wider area although the existing constraints of the estuary are such that elevated underwater noise levels generated during piling for the Project and IERRT are physically constrained to within the outer section of the Humber Estuary and are unable to directly reach the grey seal breeding site at Donna Nook. The Spurn on the Outer Humber Estuary and promontory of Grimsby Docks means that much of the underwater noise will be limited by these hard constraints and will not propagate to the outer part of the estuary and beyond. In addition, the upstream bend in the estuary at Salt End will mean that elevated underwater noise levels will not be able to propagate beyond this point. In other words, potential behavioural responses and/or displacement effects are primarily limited to the section of the estuary between around Salt End (upstream) and Grimsby to Spurn Bight (downstream).<br><br>The maximum impact piling scenario for both projects should the marine piling works overlap is for up to 7 tubular piles to be installed each day (4 piles for IERRT and 3 piles for the Project) using up to 6 piling rigs driving at any one time (4 piling rigs for IERRT and 2 piling rigs for the Project). If none of the pile driving activity for both projects were to occur at the exact same time and temporally overlap over a 24-hour period, the maximum impact pile driving scenario would involve approximately 80 minutes of vibro piling per day (20 minutes for IERRT and 60 minutes for the Project) and 450 minutes of impact piling per day (180 minutes for IERRT and 270 minutes for the Project).<br><br>Any disturbance and barrier to lamprey and grey seal movements caused by the noise during piling for the Project and IERRT would be temporary with periods during a 24-hour period when no piling will be undertaken. The proportion of impact piling is estimated to be at worst around 31 % over a 24-hour |

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| | | | | period (based on 450 minutes of impact piling per day). In other words, any lamprey and grey seals that remain within the predicted behavioural effects zone at the time of impact piling will be exposed a maximum of up to 31 % over the period of a day. The proportion of vibro piling is estimated to be at worst around 6 % over a 24- hour period (based on 80 minutes of vibro piling per day). In other words, any lamprey and grey seals that remain within the predicted behavioural effects zone at the time of piling will be exposed a total maximum of up to 37 % over the period of a day. In reality, less than 7 piles are likely to be driven per day and also there is likely to be some temporal overlap in the pile driving activity, therefore, the assumptions on maximum pile driving periods and daily exposures are considered to represent a worst case. Piling will also not take place continuously as there will be periods of downtime, pile positioning and set up.<br><br>The same mitigation measures are proposed for both the Project and IERRT to help minimise potential adverse effects (i.e., soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers). In order to take account of any potential in-combination effects should the piling programmes for both projects overlap, it is proposed that the maximum duration of percussive piling permitted within any 4-week period must not exceed a total of 196 hours where any percussive pile drivers for either one or both projects are in operation. Where percussive piling is occurring simultaneously across the two projects these respective time periods will not be double counted as the temporal exposure to this effect is not increased. This restriction applies from 1 June to 30 June and 1 August to 31 October inclusive in any year to minimise the impacts on fish (including lamprey) migrating through Humber Estuary during this period. The measurement of time during each 196-hour work-block must begin at the start of each timeframe, roll throughout it, then cease at the end, where measurement will begin again at the start of the next timeframe, such process to be repeated until the end of piling works. This restriction does not apply to percussive piling that can be undertaken outside the waterbody at periods of low water. Therefore, assuming the proposed mitigation measures for both projects are implemented, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| 27. | North Killingholme Power Project | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | **Habitat loss/damage**<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Contamination**<br>Given the extent of seabed disturbance which involves construction of an intake and marine piling any changes would cause highly localised and temporary changes in suspended sediment levels (and related changes in sediment bound contaminants and dissolved oxygen). There are no anticipated cumulative effects.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Changes in marine habitats (air quality)**<br>The assessment for the North Killingholme Power Project found no risk of exceedances for the majority of pollutants but considered the potential for an increase in nitrogen deposition which show a maximum impact around 1km north-east of the stack. The model showed maximum impacts on NOx are >1% of the critical level in all scenarios, and the total concentration exceeds critical level, however project-specific monitoring has shown that the Defra and APIS datasets overestimated NOx in the vicinity of the facility and that total concentrations are therefore likely to be below the critical level.<br>The proposed North Killingholme Power Project will operate in accordance with BAT and will be regulated by the Environment Agency which will include measures to minimise the impacts of emissions. It is reasonable to assume that the planning application process has identified a proportionate level of mitigation to do likewise for North Killingholme Power Project. The predicted in-combination effects are therefore not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |

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| | | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3) | **Disturbance**<br>• Airborne noise and visual disturbance | There is the potential for the Project along with North Killingholme Power project to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds. However, given the mitigation proposed for both projects which includes soft start procedures and timing restrictions to avoid sensitive periods, it is considered that the impacts are likely to result in mild disturbance responses. Therefore, assuming the proposed mitigation measures are followed during construction, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | | |
| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | **Disturbance**<br>• Disturbance through underwater noise and vibration | Underwater noise generated during marine piling required as part of the Project along with construction of the intake and marine piling for the North Killingholme Power project have the potential to result in cumulative effects sea and river lamprey and grey seal features in the Humber Estuary. Marine piling noise has the potential to cause injury if these features are within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber Estuary for both projects. Any barrier to movements caused by the noise during piling for the Project would be temporary with significant periods during a 24-hour period when no piling will be undertaken (the actual proportion of marine piling is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements of marine mammals through the Humber Estuary. Piling noise will take place for a small amount of time each day over a period of approximately 343 days. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect. Both projects will require similar mitigation to help minimise potential adverse effects (such as soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers).<br>Assuming appropriate mitigation measures are followed during construction, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | |
| 102. | DM/1071/22/FUL<br>Stallingborough Phase 3 Flood Alleviation Scheme-Rock revetment repair and reinforcement along a 4.5km section of the Humber Estuary, works to repair, reinstate and enable access to the gravity outfalls at Middle Drain, Oldfleet Drain and Mawmbridge Drain, associated landscape improvements, installation of temporary construction | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br>**Contamination** | **Habitat loss/damage**<br>The coastal defence project will result in a permanent loss of 0.25 ha of intertidal habitat in 11 discrete narrow strips averaging 227 m², of which the largest is no more than 10m wide and 30m long. These discrete areas of mudflat loss along the revetment are distanced roughly 100m apart. The Shadow HRA undertaken for the project concluded that '*within the Pyewipe area, there is approximately 300 ha of this Annex 1 habitat, being over 700 m at its widest extent to the south. Therefore, the loss of 0.25 ha equates to a loss of 0.08% of the total mudflats within Pyewipe. The loss of these small and discrete parcels of mudflat along the base of the existing revetment is not considered to adversely affect the function of the mudflats as a self-sustaining habitat within the Pyewipe area. This impact is considered to be ecologically inconsequential to the Humber Estuary SAC and so not adversely affecting the integrity of the site. As the impact is considered to be ecologically inconsequential, it is not considered to frustrate the conservation objective of restore the total extent. No adverse effect on the site integrity of the Humber Estuary SAC is anticipated as a result of loss of habitat constituting the qualifying feature of mudflats and sandflats not covered by seawater at high tide associated with construction of rock armour revetment*'. It should also be noted that indirect loss could also occur with respect to coastal squeeze effects with habitat loss compensated at Skeffling managed realignment site as part of the |

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| | compounds and associated infrastructure | | • Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | wider HFRMS with no additional adverse effects from this project (beyond what has already been assessed as part of the HFRMS). Losses of intertidal as a result of the proposed Project will be de minimis in extent (up to 0.0421 ha) and were assessed as not resulting in an AEOI.<br>There are potential for cumulative effects on local air quality, due to the proximity of the Humber Stallingborough Phase 3 Project from the proposed Project, shared receptors and pollutants. There is no AEOI of the proposed IGET project alone, and whilst the effects of the Humber Stallingborough Phase 3 Project cannot be confirmed until further information on that application is published, given the scale of the works it is very unlikely that any in-combination effects will be generated.<br>**Contamination**<br>In relation to water and sediment quality, the potential impacts resulting from the Humber Stallingborough Phase 3 Project (such as increased suspended sediment levels) will be highly localised, temporary and effects on features are considered negligible.<br>In relation to the release of sediment -bound contaminants, prior to excavation of the toe of the revetment sediment samples will be tested in line with OSPAR requirements to minimise the potential for mobilisation of contaminants. In addition, excavation is restricted to within a few metres of the revetment and therefore this is unlikely to result in a cumulative effect.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | **Habitat loss/damage**<br>• Physical loss of (or change to) habitat and associated species<br><br>**Disturbance**<br>• Airborne noise and visual disturbance | **Habitat loss/damage**<br>The coastal defence project will result in a permanent loss of 0.25 ha of intertidal habitat in 11 discrete narrow strips averaging 227 m², of which the largest is no more than 10m wide and 30m long. These discrete areas of mudflat loss along the revetment are distanced roughly 100m apart. The Shadow HRA undertaken for the project concluded that '*within the Pyewipe area, there is approximately 300 ha of this Annex 1 habitat, being over 700 m at its widest extent to the south. Therefore, the loss of 0.25 ha equates to a loss of 0.08% of the total mudflats within Pyewipe. The loss of these small and discrete parcels of mudflat along the base of the existing revetment is not considered to adversely affect the function of the mudflats as a self-sustaining habitat within the Pyewipe area. This impact is considered to be ecologically inconsequential to the Humber Estuary SAC and so not adversely affecting the integrity of the site. As the impact is considered to be ecologically inconsequential, it is not considered to frustrate the conservation objective of restore the total extent. No adverse effect on the site integrity of the Humber Estuary SAC is anticipated as a result of loss of habitat constituting the qualifying feature of mudflats and sandflats not covered by seawater at high tide associated with construction of rock armour revetment*'. It should also be noted that indirect loss could also occur with respect to coastal squeeze effects with habitat loss compensated at Skeffling managed realignment site as part of the wider Humber Flood Risk Management Strategy (HFRMS) with no additional adverse effects from this project (beyond what has already been assessed as part of the HFRMS). Losses of intertidal as a result of the proposed Project will be de minimis in extent (up to 0.0421 ha) and effects considered negligible given the spatial extent of these losses represents a barely measurable and inconsequential reduction in available habitat for waterbird species even at a local scale along the eastern frontage of the port.<br>**Disturbance**<br>There is the potential for the Project along with the with the flood defence works to cause cumulative effects in term of visual and noise disturbance to coastal waterbirds along the foreshore if disturbing activities associated with each of the construction programmes are being undertaken concurrently. This could reduce the amount of foreshore available with limited disturbance stimuli in the local area. It should be noted that in-combination effects are considered to be limited outside of the winter months due to the very low numbers of SPA qualifying and assemblage species occurring in proximity to the IGET Project during passage and summer months. Furthermore, the flood defence works will not be undertaken during the winter period (between October and March) which will help minimise potential |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | disturbance effects associated with this project. In order to reduce potential waterbird disturbance effects associated with the Project a range of mitigation measures are proposed. With the proposed mitigation in place for the Project, Black-tailed Godwit and other birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area).<br>If any of these infrequent local flights do occur there is still considered extensive areas of mudflat available in the local area. As the Environment Agency Stallingborough 3 flood risk management scheme will not be undertaken during the winter period (between October and March), any locally dispersed birds will have extensive areas of mudflat east of the Project towards the Pyewipe Mudflat available during the key wintering period.<br>Furthermore, ringing data suggests that the local wintering population of Black-tailed Godwits are known to have a relatively wide-ranging movements, with flocks frequently moving between alternative feeding sites in the Immingham/Grimsby area. This species is therefore considered to have some plasticity in terms of switching between different sites for feeding compared to some other waders species known to be more site faithful and which utilise smaller wintering ranges.<br>On this basis, potential effects on alternative feeding sites are predicted to be limited.<br>Furthermore, it is anticipated that majority of the Environment Agency Stallingborough 3 flood risk management will be completed by October 2024 and therefore limited temporal overlap between both of the works will occur.<br>With the proposed mitigation measures, the predicted residual in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | **Disturbance**<br>• Disturbance through underwater noise and vibration | The works for the flood defence works will be carried out from land and in the dry as far as possible. Sources of underwater noise and vibration would be limited to excavation at the toe of the revetment. Given the extent and nature of the impacts there are no predicted cumulative effects and it is concluded that there is no potential for AEOI on qualifying interest features, subject to further information becoming available. |
| | | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | | |
| 120. | PA/2023/422<br>Phillips 66 Ltd, Eastfield Road,<br>Planning permission for the construction and | Criterion 1 – natural wetland habitats that are of international importance:<br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, | **Habitat loss/damage**<br>Physical change to habitats resulting from the deposition of airborne pollutants | **Air Quality**<br>The operational assessment for the cumulative development shared ecological receptors with the IGET assessment. OE1(d), OE2 and OE10 represent IGET receptors O_E11, O_E12 and O_E17 respectively. At these receptors, the impact of IGET accounted for less than 1% of the Critical Level for NOx and less than the lower Critical Load threshold for N deposition (assuming the more precautionary vessel emissions assumptions). The impact of the Phillips 66 development is also less than 1% of the |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | operation of a post-combustion carbon capture plant, including carbon dioxide compression and metering, cooling equipment, stacks, substations, new and modified services, connections, internal roads, new access onto Eastfield Road, and maintenance and laydown areas (EIA development) | intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | | Critical Level for NOx and the lower Critical Load threshold for N deposition. Based on the impact values reported for the IGET Project and the Phillips 66 development, the combined impact at receptors O_E11 and O_E12 (SAC and SSSI) would amount to around 2% of the Critical Level for NOx and around 0.5% of the Critical Load for N deposition. At receptor O_E17 (LWS), the combined impact would amount to around 1.4% of the Critical Level for NOx and around 0.8% of the Critical Load for N deposition.<br><br>It is concluded that in-combination changes in air quality arising from the two projects will not result in an AEOI. |
| 136. | ~~Immingham Onshore Wind~~DM/0329/24/FUL<br><br>Erection of one wind turbine (T2), measuring up to 149.9m to blade tip height. Associated ancillary infrastructure to include access tracks, hardstanding areas for the turbine location, electrical infrastructure, drainage works, temporary laydown areas, temporary construction compound and associated works | Criterion 5 – Bird Assemblages of International Importance:<br><br>Wintering waterfowl - 153,934 waterfowl (5-year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br><br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br><br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | **Disturbance**<br>• Airborne noise and visual disturbance<br><br>**Collision Risk** | There is the potential for the onshore turbine project to cause displacement effects to Ramsar coastal waterbird features as well as a collision risk. However, based on the latest scheme design, the turbine locations are too distant from the foreshore and from any associated functionally linked land to cause displacement effects in waterbird species (based on a detailed review of the zone of influence of potential turbine displacement effects). In addition, collision risk modelling based on established methods and industry guidance predicts potential collision rates will be very low for all Ramsar waterbird species and will not cause population level effects. Therefore, assuming the proposed mitigation measures for the Project are implemented, the residual predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | All projects | Criterion 1 – natural wetland habitats that are of international importance:<br><br>The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | **Habitat loss/damage**<br>• Physical loss or damage of habitat through alterations in physical processes<br>• Physical damage through disturbance and/or smothering of habitat<br>• Physical loss of (or change to) habitat and associated species<br>• Physical change to habitats resulting from the deposition of airborne pollutants<br><br>**Contamination**<br>• Non-toxic contamination through elevated SSC<br>• Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases | **Habitat loss~~/damage~~**<br><br>With respect to intertidal habitat loss, ~~on the basis that compensatory habitat will be provided for the Able Marine Energy Park (AMEP) project and also for indirect losses associated with~~ the Project along with the following proposed developments will result in the loss of qualifying intertidal habitat:<br>• AMEP including Material Changes 1 and 2; and<br>• Stallingborough Phase 3 Flood Alleviation Scheme (DM/1071/22/FUL~~), all other~~);<br>• IERRT.<br><br>The AMEP project will result in a direct loss of intertidal habitat (mudflat and saltmarsh) as a result of the reclamation of the proposed quay (33 ha). Compensation for this loss will be provided at the Cherry Cobb Sands compensation site. Intertidal habitat loss as part of the Stallingborough Phase 3 Flood Alleviation Scheme will be compensated at the Skeffling managed realignment site as part of the wider Humber Flood Risk Management Strategy ("HFRMS").<br><br>With specific respect to the potential combined intertidal habitat loss as a result of IERRT and the Project, the total loss of intertidal as is anticipated to be 0.0541 ha. This is based on the combined direct losses due to jetty piling and modelling both schemes together to calculate potential indirect intertidal losses (due to erosion). The combined loss of habitat represents approximately 0.000144% of the Humber Estuary Ramsar. This combined loss represents approximately 0.000609% of intertidal foreshore habitats and approximately 0.000848% of mudflat within the Ramsar. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | The direct intertidal habitat losses for both IERRT and the Project will not involve a continuous and solid footprint (such as a reclamation) with each pile for both projects instead representing discrete and highly localised point features with large spaces of open mudflat habitat between each of the piles. These patches of mudflat between the piles and also mudflat habitat more widely in the local area will not be altered as a result of the habitat loss. Typical ecological functioning of the mudflat will continue with natural processes associated with maintaining mudflat community composition such as larval dispersal and colonisation not obstructed. As a result, no wider changes in the abundance and diversity of infaunal communities are expected. It should also be noted that no notable differences in key ecological mudflat parameters (such as elevation or sediment type) have ~~intertidal habitats losses~~ been observed around other open piled jetty structures in the Humber region and as such are not predicted for IERRT or the Project.<br><br>Indirect intertidal loss for both IERRT and the Project consists of very narrow strips on the lower shore around the sublittoral fringe. These predicted losses would be of a similar scale to that ~~are~~ which can occur due to natural background changes in mudflat extent in the local region (e.g., due to seasonal patterns in accretion and erosion or following storm events). Away from the very thin strips of predicted losses, ecological functioning of the mudflat will continue with natural processes associated with maintaining mudflat community composition such as larval dispersal and colonisation not affected. In addition, any changes associated with other ecological parameters important in maintaining mudflat such as sediment type, elevation and sediment deposition will be negligible as a result of the predicted loss.<br><br>The combined loss of both projects has been considered in the context of the site's conservation objectives as well as the respective targets of these conservation objectives (as provided in the Supplementary Advice on Conservation Objectives (SACOs).<br><br>The combined loss of direct and indirect intertidal habitat for both IERRT and the Project is *de minimis* in extent and considered negligible in the context of the amount of similar habitat in the region (and as a proportion of the SAC/Ramsar site). On this basis any change to the '*extent and distribution of qualifying natural habitats*' conservation objective and associated targets in terms of maintaining '*the presence and spatial distribution of mudflat and sandflat communities*' or restoring *'the total extent, spatial distribution and types of mudflats and sandflats*' is considered ecologically inconsequential~~.~~ both locally and more widely across the Humber Estuary site.<br><br>A loss on this scale is also considered to be insignificant in terms of '*the structure and function (including typical species) of qualifying natural habitats*' conservation objective. In this respect, the loss is considered to have no material consequences in terms of the '*presence and abundance of key structural and influential species*' target with the combined loss not considered to prevent key species from being a viable component of mudflat habitat in the local area. Furthermore, other targets relating to structure and function in terms of maintaining species composition, sediment composition and Total Organic Carbon (TOC) content in the local area or more widely across the Humber Estuary site will not be altered due to combined habitat loss on this scale.<br><br>The combined loss is also considered to be insignificant in terms of '*supporting processes on which qualifying natural habitats rely'* conservation objective with any changes to associated targets relating to wave exposure, physico-chemical properties, sediment movement, hydrodynamic regime, sediment quality and water quality parameters considered to be negligible and ecologically inconsequential on mudflat habitat in the Immingham area and more widely across the Humber Estuary site.<br><br>Therefore, in summary with the provision of the compensatory habitat required for AMEP and the Stallingborough Phase 3 Flood Alleviation Scheme and given that the combined intertidal loss of IERRT and IGET will be de minimis and ecologically inconsequential, there is no potential for an AEOI on qualifying interest habitat features as a result of intertidal habitat loss.<br><br>Subtidal losses are also considered de minimis in extent and ecologically inconsequential for all projects. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | **Habitat change**<br>Potential changes to marine habitats during construction or operation as a result of seabed disturbance (such as due to dredging or marine piling) are considered to be relatively localised, temporary and low magnitude for the Project and all other projects with no direct spatial overlap of dredge or construction footprints occurring.<br>**Air quality**<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Contamination**<br>Water quality effects are anticipated to be localised and temporary for all projects with effects on marine habitats or species considered negligible even when considered cumulatively.<br>Considering all pathways, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 5 – Bird Assemblages of International Importance:<br>Wintering waterfowl - 153,934 waterfowl (five year peak mean 1998/99-2002/3)<br><br>Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance:<br>Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)<br>Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | **Habitat loss/damage**<br>• Physical loss of (or change to) habitat and associated species<br><br>**Disturbance**<br>• Airborne noise and visual disturbance | **Habitat loss/damage**<br>With respect to intertidal habitat loss for coastal waterbirds, on the basis that compensatory habitat will be provided for the AMEP project and also for indirect losses associated with the Stallingborough Phase 3 Flood Alleviation Scheme (DM/1071/22/FUL), all other projects have intertidal habitats losses that are considered de minimis in extent and ecologically inconsequential. On this basis, the predicted in-combination effects are not considered to compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features.<br>**Disturbance**<br>Potential noise and visual disturbance during construction as a result of the Project along with several other projects have the potential to result in potential disturbance to coastal waterbirds. It should be noted that in-combination effects are considered to be limited outside of the winter months due to the very low numbers of SPA qualifying and assemblage species occurring in proximity to the IGET Project during passage and summer months. With the proposed mitigation in place for the Project, wintering Black-tailed Godwit and other birds would be expected to be able to continue to feed on mudflat in the footprint of the Project during the winter months with only very limited responses anticipated (involving infrequent and mild responses i.e. at worst, very localised flight responses with birds resuming feeding quickly in local area).<br>If any of these infrequent local flights do occur there is still considered extensive areas of mudflat available in the local area available even if both the nearby Environment Agency Stallingborough 3 flood risk management scheme and IERRT project may be taking place at the same time as the Project.<br>With respect to the Environment Agency Stallingborough 3 flood risk management scheme, the flood defence works will not be undertaken during the winter period (between October and March). On this basis, any locally dispersed birds will have extensive areas of mudflat east of the Project towards the Pyewipe Mudflat available during the key wintering period.<br>With respect to IERRT, with the proposed winter restriction on construction in place (from 1 October to 31 March on activity including piling within 200 m of exposed foreshore), extensive mudflat is also available for feeding west of the IOT jetty for any locally dispersed birds due to IGET. With this measure, birds would be anticipated to have alternative feeding opportunities along the foreshore fronting the Port of Immingham. It should also be noted that approximately 90 and 70 % respectively of the foreshore at low water between the Inner Dock entrance and the IOT (i.e. the mudflat habitat |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | fronting the Port of Immingham) will be at distances of more than 200 m and 300 m respectively from the construction zone.<br>Furthermore, ringing data suggests that the local wintering population of Black-tailed Godwits are known to have a relatively wide-ranging movements, with flocks frequently moving between alternative feeding sites in the Immingham/Grimsby area. This species is therefore considered to have some plasticity in terms of switching between different sites for feeding compared to some other waders species known to be more site faithful and which utilise smaller wintering ranges.<br>On this basis, potential effects on alternative feeding sites are predicted to be limited.<br>Therefore, with the proposed mitigation required for each project there is considered to be no potential for AEOI on qualifying interest features. Furthermore, it is anticipated that majority of the Environment Agency Stallingborough 3 flood risk management will be completed by October 2024 and therefore limited temporal overlap between both of the works will occur.<br>It is therefore considered a reasonable and robust conclusion that the predicted residual in-combination effects will not compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying interest features. |
| | | Criterion 3 – supports populations of plants and/or animal species of international importance:<br>The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast.<br>Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path:<br>The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | **Disturbance**<br>• Disturbance through underwater noise and vibration | The key relevant projects that have the potential to result in in-combination effects with the Project through underwater noise and vibration disturbance include:<br>• Maintenance dredge disposal at Grimsby, Immingham and Sunk Dredged Channel (ID 115) (due to dredging);<br>• Humber International Terminal (HIT) berth 2: adaptation for car carriers (ID 94) (due to piling);<br>• AMEP including Material Changes 1 and 2 (ID 25) (due to piling and dredging);<br>• IERRT (ID 22) (due to piling and dredging); and<br>• North Killingholme Power Project (ID 27) (due to piling).<br>**Migratory fish**<br>Underwater noise (on lamprey species~~ and grey seal~~) as a result of the Project along with several other projects have the potential to result in adverse significant effects in migratory fish ~~and marine mammals~~ species. However, there is considered to be no potential for AEOI on qualifying interest features as a result of the Project with the proposed mitigation measures. All projects will be subject to similar mitigation measures to avoid the potential for adverse underwater noise effects on these features.<br>It is therefore considered a reasonable and robust conclusion that predicted residual in-combination effects will not compromise any of the conservation objectives, and it is concluded that there is no potential for AEOI on qualifying migratory fish interest features.<br>**Marine mammals**<br>**Dredging**<br>Underwater noise impacts as a result of the Project along with several other projects have the potential to result in cumulative effects on marine mammal features. In the context of dredging, this is only expected to cause behavioural reactions in a relatively localised area in the vicinity of the dredger for all projects that would not cause a barrier effect. It is therefore concluded that the predicted residual in-combination effects from dredging will not compromise any of the conservation objectives and there is no potential for an AEOI on qualifying marine mammal interest features from dredging activities associated with the Project and other projects.<br>**Piling** |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | Projects involving piling (i.e. HIT Berth 2, AMEP, IERRT and North Killingholme Power Project) have the potential to cause injury effects within close proximity to the marine piling activity and strong behavioural responses over a wider area of the Humber Estuary.<br><br>*Injury*<br><br>Assuming seals evade the injury effects zone, they are not considered to be at risk of any instantaneous or cumulative injury effects during impact piling across all projects. This risk is further mitigated through the use of soft start piling techniques and marine mammal observers to ensure there are no seals within the vicinity of the works. It is assumed that other projects together with the Project will be subject to these controls to avoid the potential for cumulative and in-combination effects on features of designated sites. Assuming the proposed mitigation measures for other projects and the Project are implemented, the predicted sum of the residual injury effects from all projects in-combination are not considered to compromise any of the conservation objectives, and it is therefore concluded that there is no potential for AEOI on qualifying marine mammal interest features from piling activities.<br><br>*Behaviour*<br><br>Potential behavioural responses and/or displacement effects are primarily limited to the section of the estuary between around Salt End (upstream) and Grimsby to Spurn Bight (downstream) (see Figure 16.1 of ES **[APP-126]**).<br><br>The Spurn on the Outer Humber Estuary and promontory of Grimsby Docks mean that much of the underwater noise generated by percussive piling by all projects will be limited by these hard constraints. This means that noise will not propagate to the outer part of the estuary and beyond and as such will not affect the grey seal breeding colony at Donna Nook. This also leaves expansive areas of the North Sea in which seals can forage, with only a very small percentage of their foraging ranges affected by the projects in-combination. Furthermore, as summarised in Section 1.3 of Appendix A, grey seals can undertake wide ranging seasonal movements over several thousand kilometres. Therefore, seals are likely to be able to exploit a much wider area for foraging during any marine piling activity.<br><br>Similarly, the upstream bend in the estuary at Salt End will mean that elevated underwater noise levels from all projects will not be able to propagate beyond this point. The Humber Estuary upstream of the Project is not known to be used as a breeding site for seals and as highlighted above, the area affected would only represent a very small percentage of their foraging ranges affected by the projects in-combination.<br><br>The proposed mitigation measures for underwater noise will further limit the risk of exposure and reduces the residual impact of the Project on marine mammal features to a minor adverse effect.<br><br>In addition, any disturbance and barrier to movements caused by the noise during marine piling would be temporary with significant periods during a 24-hour period when no piling will be undertaken. Marine piling will also not take place continuously as there will be periods of downtime, pile positioning and set up. The actual proportion of marine piling for the Project is estimated to be at worst around 23% over a 24-hour period (based on 270 minutes of impact marine piling and 60 minutes of vibro marine piling each working day) over any given construction week. This of itself will allow the unconstrained movements of marine mammals through the Humber Estuary.<br><br>The maximum impact piling scenario for both the Project and IERRT, assuming the construction works overlap, is for up to 7 tubular piles to be installed each day (4 piles for IERRT and 3 piles for the Project) using up to 6 piling rigs driving at any one time (4 piling rigs for IERRT and 2 piling rigs for the Project). If none of the pile driving activity for both projects were to occur at the exact same time and temporally overlap over a 24-hour period, the maximum impact pile driving scenario would involve approximately 80 minutes of vibro piling per day (20 minutes for IERRT and 60 minutes for the Project) and 450 minutes of impact piling per day (180 minutes for IERRT and 270 minutes for the Project).<br><br>Any disturbance and barrier to grey seal movements caused by the noise during piling for the Project and IERRT would be temporary with periods during a 24-hour period when no piling will be undertaken. |

| ID | Plan/Project | Features | Summary of potential effects | Potential for AEOI |
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| | | | | The proportion of impact piling is estimated to be at worst around 31 % over a 24-hour period (based on 450 minutes of impact piling per day). In other words, any grey seals that remain within the predicted behavioural effects zone at the time of impact piling will be exposed to a maximum of up to 31 % over the period of a day. The proportion of vibro piling is estimated to be at worst around 6 % over a 24-hour period (based on 80 minutes of vibro piling per day). In other words, any grey seals that remain within the predicted behavioural effects zone at the time of piling will be exposed to a total maximum of up to 37 % over the period of a day. In reality, less than 7 piles are likely to be driven per day and also there is likely to be some temporal overlap in the pile driving activity, therefore, the assumptions on maximum pile driving periods and daily exposures are considered to represent a worst case. Piling will also not take place continuously as there will be periods of downtime, pile positioning and set up.<br><br>The same mitigation measures are proposed for both the Project and IERRT to help minimise potential adverse effects (i.e., soft start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers). In order to take account of any potential in-combination effects should the piling programmes for both projects overlap, it is proposed that the maximum duration of percussive piling permitted within any 4-week period must not exceed a total of 196 hours where any percussive pile drivers for either one or both projects are in operation. Where percussive piling is occurring simultaneously across the two projects these respective time periods will not be double counted as the temporal exposure to this effect is not increased.<br><br>Other projects involving piling (i.e. HIT Berth 2, AMEP and North Killingholme Power Project) will also require similar mitigation to the Project to help minimise or avoid the potential for cumulative and in-combination effects on features of designated sites (such as soft-start procedures, timing restrictions to avoid sensitive periods for migratory fish and the use of marine mammal observers). It is assumed that other projects together with the Project will be subject to controls by the statutory bodies to avoid the potential for cumulative and in-combination effects on features of designated sites. It should also be noted that for other projects, if there was overlap of marine piling activities with the Project, simultaneous piling would not increase the overall temporal exposure to underwater noise.<br><br>In summary, assuming the proposed mitigation measures for other projects (i.e. HIT Berth 2, AMEP, IERRT and North Killingholme Power Project) and the Project are implemented, the predicted sum of the residual behavioural effects from all projects in-combination are not considered to compromise any of the conservation objectives, and it is therefore concluded that there is no potential for AEOI on qualifying marine mammal interest features, as a result of piling and/or dredging activities. |

# 5. Conclusions

5.1.1. This report provides information for the Secretary of State, as the relevant Competent Authority for the DCO application, to undertake the first two stages of a Habitats Regulations Assessment as required under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 1-4).

5.1.2. The Stage one (Screening) assessment has considered how the Project might affect five European sites in the vicinity of the Project. This screening stage concluded that Likely Significant Effects could not be discounted with respect to four European sites, all with coincident boundaries:

a. Humber Estuary SAC.

b. Humber Estuary SPA.

c. Humber Estuary Ramsar site.

d. The Wash and North Norfolk Coast SAC.

5.1.3. The impact pathways screened into stage 2 (AA) covered the following pathways:

a. Physical loss of habitat and associated species.

b. Physical damage through disturbance and/or smothering of habitat.

c. Physical loss or damage of habitat through alterations in physical processes.

d. Direct changes to qualifying habitats beneath marine infrastructure due to shading.

e. Physical change to habitats resulting from the deposition of airborne pollutants.

f. Non-toxic contamination through elevated SSC.

g. Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases.

h. Airborne noise and visual disturbance.

i. Disturbance through underwater noise and vibration.

j. Biological disturbance due to potential introduction and spread of non-native species.

k. Changes to foraging and behaviour due to artificial lighting.

5.1.4. At Stage two AA, further information has been collated to examine the potential for changes in the baseline conditions as a result of the Project with reference to the conservation objectives for each site. Where relevant, mitigation measures have been proposed to reduce the potential for adverse effects.

5.1.5. The assessment has concluded that for the majority of pathways there is no potential for an adverse effect on site integrity or any potential for the predicted effects to compromise any of the conservation objectives. However, for two pathways there was uncertainty in this conclusion either due to uncertainties in timing of construction (e.g., in relation to sensitive migration periods). This was relevant to the following pathways:

a. The potential effects of airborne noise and visual disturbance during construction and decommissioning on qualifying species of coastal waterbird.

b. The potential effects of underwater noise and vibration during marine piling on qualifying species of fish and marine mammals.

5.1.6. Mitigation has been identified in relation to the effects of airborne noise and visual disturbance during construction which includes restrictions on working over winter in certain locations, acoustic barriers and visual screens, soft-start marine piling and cold weather restrictions. In addition, due to the uncertainty associated with the techniques to undertake the removal of pipe racks within Work Area 2 (the jetty access road) and plant and equipment on the approach jetty topside associated with hydrogen production (within Work Area 1), a commitment has been made to undertake these works outside of the overwintering period.

5.1.7. Based on the distribution of birds, the likely level of disturbance and the Applicant's commitment to mitigation, it is considered that there will be no adverse effects on the integrity of either the Humber Estuary SPA or Ramsar from the effects of airborne noise and visual disturbance.

5.1.8. Mitigation has been identified in relation to the effects of underwater noise and vibration during marine piling which includes soft-start marine piling, vibro marine piling where possible, seasonal marine piling restrictions, night-time marine piling restrictions and use of Marine Mammal Observers.

5.1.9. Based on the assessment of effects on qualifying species (river and sea lamprey and grey seal), the likely level of disturbance and the Applicant's commitment to mitigation, it is considered that there will be no adverse effects on the integrity of the Humber Estuary SAC or Ramsar from the effects of underwater noise and vibration during marine piling. There is also considered to be no adverse effects on the integrity of The Wash and North Norfolk Coast SAC (as a result of underwater noise and vibration during marine piling on the common seal qualifying feature), based on the Applicant's commitment to mitigation.

5.1.10. A summary of the mitigation measures that the Applicant has committed to is provided in **Table 39**. Further detail is provided in Section 4 of this report.

5.1.11. A review of other plans and projects that could contribute to effects has established that no significant adverse in-combination effects on site integrity with other plans and projects will occur.

5.1.12. In conclusion, based on best available scientific information and professional judgement, it is considered that the construction and consequent operation of the Project (alone or in combination with other plans or projects) will not have an adverse effect on the integrity of any European designated sites in view of that sites conservation objectives.

## Table 39: Summary of proposed mitigation measures

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| Airborne noise and visual disturbance during construction | Winter marine construction restriction from 1 October to 31 March within 200 m of Mean Low Water Springs (until acoustic barrier/visual screen on approach jetty from 1 October to 31 March) for activity associated with the approach jetty within 200 m of Mean Low Water Springs. Further details on this mitigation measure are provided in paragraph 4.10.31.<br><br>This will be secured through a condition of the deemed marine licence. | The measure is considered effective at minimising disturbance and when applied as part of the overall construction disturbance mitigation package is considered effective at reducing disturbance to a level which will not cause an AEOI. The effectiveness of this measure is described in more detail in Appendix E and specifically with respect to minimising the potential for AEOI on qualifying features in **Table 27**. | Humber Estuary SPA:<br>• A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>• A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>• A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>• A162: Common Redshank *Tringa*<br>• Waterbird assemblage<br><br>Humber Estuary Ramsar site:<br>• Criterion 5 – Bird Assemblages of International Importance: Wintering waterfowl - 153,934 waterfowl (5-year peak mean 1998/99-2002/3)<br>• Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage) Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | High: Spatial and temporal effectiveness of the restriction is well understood based on existing evidence. |
| | Noise suppression system during all percussive piling activities for the approach | The measure is considered effective at helping to reduce potential noise related | Humber Estuary SPA: | High: The effectiveness of the measure is based on applying well |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | jetty. Further details on this mitigation measure are provided in paragraph 4.10.31.<br><br>This will be secured through a condition of the deemed marine licence. | disturbance associated with piling and when applied as part of the overall construction disturbance mitigation package is considered effective at minimising disturbance to a level which will not cause an AEOI. The effectiveness of this measure is described in more detail in Appendix E and specifically with respect to minimising the potential for AEOI on qualifying features in **Table 27**. | • A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>• A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>• A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>• A162: Common Redshank *Tringa*<br>• Waterbird assemblage<br><br>Humber Estuary Ramsar site:<br><br>• Criterion 5 – Bird Assemblages of International Importance: Wintering waterfowl - 153,934 waterfowl (5-year peak mean 1998/99-2002/3)<br>• Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | established noise criteria and detailed airborne noise modelling. |
| | Apply soft start procedures during all percussive piling. Further details on this mitigation measure are | The measure is considered effective at helping to reduce potential noise related disturbance associated with piling and when applied as | Humber Estuary SPA:<br><br>• A048; Common Shelduck (Non-breeding) *Tadorna tadorna* | Medium: The measure is considered likely to be effective based on existing information. |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | provided in paragraph 4.10.31.<br><br>This will be secured through a condition of the deemed marine licence. | part of the overall construction disturbance mitigation package is considered effective at minimising disturbance to a level which will not cause an AEOI. The effectiveness of this measure is described in more detail in Appendix E and specifically with respect to minimising the potential for AEOI on qualifying features in **Table 27**. | • A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>• A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>• A162: Common Redshank *Tringa*<br>• Waterbird assemblage<br><br>Humber Estuary Ramsar site:<br><br>• Criterion 5 – Bird Assemblages of International Importance: Wintering waterfowl - 153,934 waterfowl (5-year peak mean 1998/99-2002/3)<br>• Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | |
| | Cold weather construction restriction implemented following seven consecutive days of freezing (zero or sub-zero temperature) weather conditions. Further details on this mitigation measure are | This measure will ensure that no foreshore or marine construction activity is undertaken during freezing periods when waterbirds are considered particularly vulnerable to disturbance with | Humber Estuary SPA:<br><br>• A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>• A149: Dunlin *Calidris alpina alpina* (Non-breeding) | High: Effectiveness is well understood based on existing evidence. |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | provided in paragraph 4.10.31.<br><br>This will be secured through a condition of the deemed marine licence. | potential disturbance effects completely avoided during the restriction. When applied as part of the overall construction disturbance mitigation package, this measure is considered effective at minimising disturbance to a level which will not cause an AEOI. | • A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>• A162: Common Redshank *Tringa*<br>• Waterbird assemblage<br><br>Humber Estuary Ramsar site:<br><br>• Criterion 5 – Bird Assemblages of International Importance: Wintering waterfowl - 153,934 waterfowl (5-year peak mean 1998/99-2002/3)<br>• Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | |
| Airborne noise and visual disturbance during decommissioning | Winter restriction from 1 October to 31 March for decommissioning work associated with the removal of pipe racks within Work Area 2 (the jetty access road) and plant and equipment on the approach jetty topside associated with hydrogen production (within Work Area 1) where the works are | This measure will ensure that wintering coastal waterbirds on the foreshore are not exposed to potentially disturbing activity associated with the removal of pipe racks within Work Area 2 (the jetty access road).<br><br>This measure is considered effective at minimising | Humber Estuary SPA:<br><br>• A048; Common Shelduck (Non-breeding) *Tadorna tadorna*<br>• A149: Dunlin *Calidris alpina alpina* (Non-breeding)<br>• A156: Black-tailed Godwit *Limosa limosa islandica* (Non-breeding)<br>• A162: Common Redshank *Tringa*<br>• Waterbird assemblage | |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | located within 200 m of exposed mudflat. | disturbance to a level which will not cause an AEOI. | Humber Estuary Ramsar site:<br>• Criterion 5 – Bird Assemblages of International Importance: Wintering waterfowl - 153,934 waterfowl (5-year peak mean 1998/99-2002/3)<br>• Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage)Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | |
| Underwater noise and vibration during piling on qualifying species | Apply soft start procedures during percussive piling based on JNCC piling protocol. Further details on this mitigation measure are provided in paragraph 4.11.45.<br><br>This will be secured through a condition of the deemed marine licence. | The measure will help reduce potential underwater effects to lamprey and seals and marine mammals through providing an opportunity to move away from the area before the onset of full impact strikes as described in paragraph 4.11.45. When applied as part of the overall construction disturbance mitigation package this measure is considered effective at minimising disturbance to a level which will not cause an AEOI. | Humber Estuary SAC:<br>• S1099: River lamprey *Lampetra fluviatilis*<br>• S1095: Sea lamprey *Petromyzon marinus*<br>• S1364: Grey seal *Halichoerus grypus*<br><br>Humber Estuary Ramsar site:<br>• Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path: The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and | Medium to high: Effectiveness is generally well understood based on existing evidence. |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | | | sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas.<br>• Criterion 3 – supports populations of plants and/or animal species of international importance: The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast.<br><br>The Wash and North Norfolk Coast SAC:<br><br>• 1365: Harbour seal *Phoca vitulina* | |
| | Use vibro piling where possible. Further details on this mitigation measure are provided in paragraph 4.11.45.<br><br>This is secured in condition 15 (5) of Part 2 of the Deemed Marine Licence (DML) at Schedule 3 of the draft DCO. | The measure will help cause less potential displacement and a reduced acoustic barrier compared to percussive piling as described in paragraph 4.11.45. When applied as part of the overall construction disturbance mitigation package this measure is considered effective at minimising disturbance to a level which will not cause an AEOI. | Humber Estuary SAC:<br><br>• S1099: River lamprey *Lampetra fluviatilis*<br>• S1095: Sea lamprey *Petromyzon marinus*<br>• S1364: Grey seal *Halichoerus grypus*<br><br>Humber Estuary Ramsar site:<br><br>• Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration | Medium to high: Effectiveness is generally well understood based on existing evidence. |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | | | path: The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas.<br>• Criterion 3 – supports populations of plants and/or animal species of international importance: The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast.<br><br>The Wash and North Norfolk Coast SAC:<br><br>• 1365: Harbour seal *Phoca vitulina* | |
| | Seasonal percussive piling including no percussive piling is to take place within the waterbody between 1 April and 31 May and restrictions on the duration of percussive piling within the waterbody from 1 June to 30 June and 1 August to 31 October. Further details on this mitigation | The seasonal restriction will help limit potential disturbance effects to sea lamprey during sensitive migratory periods as described in paragraph 4.11.45. When applied as part of the overall construction disturbance mitigation package this measure is considered effective at minimising disturbance to a | Humber Estuary SAC<br><br>• S1095: Sea lamprey *Petromyzon marinus*<br><br>Humber Estuary Ramsar site:<br><br>• Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration | Medium to high: The effectiveness of the measure is based on an understanding of sensitive periods for lamprey species and the approach taken for other consented developments on the Humber Estuary. |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | measure are provided in paragraph 4.10.43.<br><br>This will be secured through a condition of the deemed marine licence. | level which will not cause an AEOI. | path: The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | |
| | Night-time piling restriction within the waterbody between 1 March to 31 March, 1 June to 30 June and 1 August to 31 October inclusive, piling will be restricted at night. Specifically, no percussive piling will be undertaken from 19:00 to 07:00 in March, September and October and between sunset and sunrise in June and August. Further details on this mitigation measure are provided in paragraph 4.11.43.<br><br>This will be secured through a condition of the deemed marine licence. | The restriction will help limit potential disturbance effects to river lamprey during sensitive migratory periods as described in paragraph 4.11.45. When applied as part of the overall construction disturbance mitigation package this measure is considered effective at minimising disturbance to a level which will not cause an AEOI. | Humber Estuary SAC:<br>• S1099: River lamprey *Lampetra fluviatilis*<br><br>Humber Estuary Ramsar site:<br>• Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path: The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | High: The effectiveness of the measure is based on an understanding of sensitive periods for lamprey. |

| Impact pathway | Proposed mitigation | Mitigation effectiveness | Target feature | Confidence in mitigation effectiveness |
|---|---|---|---|---|
| | Marine Mammal Observer will follow JNCC protocol to minimise the risk of injury to marine mammals during percussive piling. Further details on this mitigation measure are provided in paragraph 4.11.45.<br><br>This will be secured through a condition of the deemed marine licence. | Following JNCC measures will help limit potential injury effects to seals as described in paragraph 4.11.45. When applied as part of the overall construction disturbance mitigation package this measure is considered effective at minimising disturbance to a level which will not cause an AEOI. | Humber Estuary SAC:<br>• S1364: Grey seal *Halichoerus grypus*<br>Humber Estuary Ramsar site:<br>• Criterion 3 – supports populations of plants and/or animal species of international importance: The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast.<br>The Wash and North Norfolk Coast SAC:<br>• 1365: Harbour seal *Phoca vitulina* | High: The mitigation is based on well established protocols which are widely applied to both inshore and offshore developments involving piling. |

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# 7. Abbreviations/Acronyms

| | |
|---|---|
| AA | Appropriate Assessment |
| ABB | ABB Power Generation Ltd |
| ABP | Associated British Ports |
| AEOI | Adverse Effect On Integrity |
| AL | Action Level |
| AMEP | Able Marine Energy Park |
| APIS | Air Pollution Information System |
| AQ | Air Quality |
| AQC | Air Quality Consultants |
| BAT | Best Available Techniques |
| BTO | British Trust for Ornithology |
| CCS | Carbon Capture and Storage |
| CEDA | Centre for Environmental Data Analysis |
| Cefas | Centre for Environment, Fisheries and Aquaculture Science |
| CEMP | Construction Environmental Management Plan |
| CHEEM | Cutts & Hemingway Estuarine Ecology and Management |
| CoCP | Code of Construction Practice |
| COVID | Coronavirus |
| CREAM | Calculator for Road Emissions of Ammonia |
| cSAC | Candidate Special Areas of Conservation |
| CSIP | Cetacean Strandings Investigation Programme |
| dB | Decibel |
| dBA | A-weighted decibel |
| DCO | Development Consent Order |
| Defra | Department for Environment, Food and Rural Affairs |

| | |
|---|---|
| DML | Deemed Marine Licence |
| DMRB | Design Manual for Roads and Bridges |
| DNA | Deoxyribonucleic Acid |
| EC | European Commission |
| ECoW | Ecological Clerk of Works |
| EEA | European Economic Area |
| EEC | European Economic Community |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EMS | European Marine Site |
| EPUK | Environmental Protection UK |
| ERM | ERM Group |
| ES | Environmental Statement |
| EU | European Union |
| EUNIS | European Nature Information System |
| ExA | Examining Authority |
| FID | Flight Initiation Distance |
| GPS | Global Positioning System |
| HDD | Horizontal Directional Drilling |
| HEEs | High Energy Events |
| HFRMS | Humber Flood Risk Management Strategy |
| HGVs | Heavy Goods Vehicle |
| HIT | Humber International Terminal |
| HM | Her Majesty’s (His Majesty’s) |
| HRA | Habitats Regulations Assessment |
| IAQM | Institute of Air Quality Management |

| | |
|---|---|
| ID | Identity |
| IECS | Institute of Estuarine & Coastal Studies |
| IERRT | Immingham Eastern Ro-Ro Terminal |
| IGET | Immingham Eastern Roll-on Roll-off Terminal |
| IMO | International Maritime Organisation |
| IOH | Immingham Outer Harbour |
| IOT | Immingham Oil Terminal |
| IROPI | Imperative Reasons of Overriding Public Interest |
| IUCN | International Union for Conservation of Nature |
| JNCC | In-combination Climate Change Impacts |
| LAeq | Equivalent Continuous Sound Pressure Level, |
| LAmax F | Maximum 'A'-weighted Sound Pressure Level (Fast Time Weighed) |
| LAQM TG | Local Air Quality Management Technical Guidance |
| Lmax. | Maximum 'A'-weighted Sound Pressure Level |
| LMP | Lighting Management Plan |
| LSE | Likely Significant Effect |
| LWS | Local Wildlife Site |
| MAGIC | Multi-Agency Geographic Information for the Countryside |
| MarESA | Marine Evidence based Sensitivity Assessment |
| MarLIN | Marine Life Information Network |
| MARPOL | The International Convention for the Prevention of Pollution from Ships |
| MCAA | Marine and Coastal Access Act |
| MHWS | Mean High Water Springs |
| MLWN | Mean Low Water Neaps |
| MLWS | Mean Low Water Springs |
| MMO | Marine Management Organisation |

| | |
|---|---|
| MP | Mean Peak |
| MPA | Marine Protected Area |
| MPS | Marine Policy Statement |
| MS | Marine Straggler species |
| MW | Megawatt |
| NBN | National Biodiversity Network |
| NE | Natural England |
| NECR | Natural England Research Report |
| NGR | National Grid Reference |
| NIFPP | Nseleni Independent Floating Power Plant |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| NPPF | National Planning Policy Framework |
| NSIP | Nationally Significant Infrastructure Projects |
| O&M | Operation and Maintenance |
| OCEMP | Outline Construction Environmental Management Plan |
| OCGT | Open Cycle Gas Turbine |
| OSPAR | Convention for the Protection of the Marine Environment of the North-East Atlantic |
| OtSMRS | Outstrays to Skeffling Managed Realignment Scheme |
| µPa | micropascal |
| PAH | Polycyclic Aromatic Hydrocarbons |
| PCBs | Polychlorinated Biphenyl |
| PEI | Preliminary Environmental Information |
| PEIR | Preliminary Environmental Information Report |
| PIANC | The World Association for Waterborne Transport Infrastructure |

| | |
|---|---|
| PINS | Planning Inspectorate |
| pSAC | Possible Special Area of Conservation |
| pSPA | Potential Special Protection Areas |
| PTS | Permanent Threshold Shifts |
| PW | Phocid Pinniped |
| Ramsar | Wetlands of international importance, designated under The Convention on Wetlands (Ramsar, Iran, 1971) |
| REC | Regional Environmental Characterisation |
| Ro-Ro | Roll On-Roll Off |
| RSPB | Royal Society for the Protection of Birds |
| SAC | Special Area of Conservation |
| SACOs | Supplementary Advice on Conservation Objectives |
| SCI | Site of Community Importance |
| SCOS | Special Committee on Seals |
| SEL | Sound Exposure Levels |
| SL | Source Level |
| SPA | Special Protection Area |
| SPL | Sound Pressure Levels |
| SSC | Suspended Sediment Concentrations |
| SSSI | Site of Special Scientific Interest |
| TBT | Tributyltin |
| TOC | Total Organic Carbon |
| TSHD | Trailer Suction Hopper Dredger |
| TTS | Temporary Threshold Shift |
| UK | United Kingdom |
| UNECE | United Nations Economic Commission for Europe |

| | |
|---|---|
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| WCA | Wildlife and Countryside Act |
| WeBS | Wetland Bird Survey |
| WGE | Working Group on Effects |
| WODA | World Organization of Dredging Associations |
| ZoI | Zone of Influence |

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

# Appendix A: Baseline to Inform the Shadow HRA

I

# Immingham Green Energy Terminal

## Shadow Habitats Regulations Assessment: Appendix A

Associated British Ports

July 2024

**IGET DCO DOCUMENT ISSUE SHEET**

# Table of contents

# 1 HRA Baseline

## 1.1 Introduction

1.1.1 This appendix provides baseline ecological information relevant to the Shadow HRA. This information is a summary of baseline data provided in **Chapter 9: Nature Conservation (Marine Ecology) [TR030008/APP/6.2])** and **Chapter 10: Ornithology [TR030008/APP/6.2])** but focused specifically on features of relevant designated sites.

1.1.2 This report has been structured as follows:

- **Section 2: Designated sites** provides a summary of citation information for the Humber Estuary European Marine Site (EMS), the Wash and North Norfolk Coast Special Area of Conservation (SAC) and Greater Wash Special Protection Area (SPA).
- **Section 3: Marine ecology features** summaries baseline information on benthic habitats and species, lamprey and seal features of relevant designated sites; and
- **Section 4**: **Coastal waterbird features** summaries baseline information on coastal waterbirds features of relevant designated sites.

1.1.3 This appendix is also supported by the following figures and annexes:

- **Figure A-1**: Internationally and nationally designated conservation sites**;**
- **Figure A-2**: Project specific subtidal benthic sampling stations;
- **Figure A-3**: Annual grey seal pup counts at Donna Nook (Source: Ref 1-1);
- **Figure A-4**: Aerial counts of grey seals at Donna Nook (Source: Ref 1-1);
- **Figure A-5**: Monitoring locations of coastal waterbird surveys in the vicinity of the Project;
- **Figure A-6**: The 5-year mean peak number of birds in Sector C during different winter months;
- **Figure A-7**: The broad distribution of coastal waterbirds in Sector C;
- **ANNEX A.1**: Bird data for Sector C (between the Immingham Oil Terminal Jetty and Oldfleet Drain as shown in **Figure A-5**), covering the period October 2021 to September 2022 which covers winter, passage and summer months. In addition, a summary of surveys undertaken on terrestrial land within the proposed Project footprint to understand the potential for supporting coastal waterbird species is also provided; and Annex A.2: Summary bird data for Sectors A and B.

## 1.2 Designated sites

1.2.1 The Project falls within the boundaries of the Humber Estuary SAC, SPA and Ramsar site (collectively forming the Humber EMS; **Figure A-1**). For the Humber Estuary SAC, the primary reason for designation is the presence of two broad scale habitats, 1130 Estuaries and 1140 Mudflats and sandflats not covered by seawater at low tide (Ref 1-2). These broad scale habitats support other more specific habitats which are qualifying features but not a primary reason for designation. These are:

- 1110 Sandbanks which are slightly covered by sea water all the time;
- 1150 Coastal lagoons (identified as a priority feature);
- 1310 *Salicornia* and other annuals colonizing mud and sand;
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*);
- 2110 Embryonic shifting dunes;
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes");
- 2130 Fixed coastal dunes with herbaceous vegetation ("grey dunes") (identified as a priority feature); and
- 2160 Dunes with *Hippopha rhamnoides*.

1.2.2 Alongside the habitats for which the SAC is designated, there are also three mobile species listed on Annex II of the EU Habitats Directive (92/43/EEC) (the Natural Habitats and Wild Fauna and Flora Directive) included in the designation (Ref 1-2), namely:

- 1095 Sea lamprey (*Petromyzon marinus*);
- 1099 River lamprey (*Lampetra fluviatilis*); and
- 1364 Grey seal (*Halichoerus grypus*).

1.2.3 Qualifying features of the Humber Estuary SPA and Humber Estuary Ramsar site are shown in **Table A-1**: and Table A-2 respectively.

**Table A-1: Qualifying features of the Humber Estuary SPA (Ref 1-3)**

| | |
|---|---|
| **Internationally Important Populations** | |
| **Internationally Important Populations of Regularly Occurring Annex 1 Species** | |
| Breeding Species Population | |
| Bittern *Botaurus stellaris* | 2 calling males (10.5% of the GB population) |
| Marsh Harrier *Circus aeruginosus* | 10 breeding females (6.3% of the GB population) |
| Avocet *Recurvirostra avosetta* | 64 pairs (8.6% of the GB population) |
| Little Tern *Sternula albifrons* | 51 pairs (2.1% of the GB population) |

| | |
|---|---|
| **Internationally Important Populations** | |
| Wintering Species Population | |
| Bittern | 4 (4.0% of the GB population) |
| Hen harrier *Circus cyaneus* | 8 (1.1% of the GB population) |
| Bar-tailed Godwit *Limosa lapponica* | 2,752 (4.4% of the GB population) |
| Golden Plover *Pluvialis apricaria* | 30,709 (12.3% of the GB population) |
| Avocet *Recurvirostra avosetta* | 54 (1.7% of the GB population) |
| On passage Species population | |
| Ruff *Calidris pugnax* | 128 (1.4% of the GB population) |
| **Internationally Important Populations of Regularly Occurring Migratory Species** | |
| Wintering Species Population | |
| Teal† *Anas crecca* | 2,322 (<1% of the population) |
| Wigeon† *Mareca penelope* | 5,044 (<1% of the population) |
| Mallard† *Anas platyrhynchos* | 2,456 (<1% of the population) |
| Turnstone† *Arenaria interpres* | 629 (<1% of the population) |
| Common Pochard† *Aythya ferina* | 719 (<1% of the population) |
| Greater Scaup† *Aythya marila* | 127 (<1% of the population) |
| Brent Goose† *Branta bernicla* | 2,098 (<1% of the population) |
| Goldeneye† *Bucephala clangula* | 467 (<1% of the population) |
| Sanderling† *Calidris alba* | 486 (<1% of the population) |
| Dunlin *Calidris alpina* | 22,222 (1.7% of the Northern Siberia/Europe/Western Africa population) |
| Red Knot *Calidris canutus* | 28,165 (6.3% of the North-eastern Canada/Greenland/Iceland/North-western Europe population) |
| Ringed Plover† *Charadrius hiaticula* | 403 (<1% of the population) |
| Oystercatcher† *Haematopus ostralegus* | 3503 (<1% of the population) |
| Black-tailed Godwit *Limosa* | 1,113 (3.2% of the Icelandic Breeding population) |
| Curlew† *Numenius arquata* | 3,253 (<1% of the population) |

| **Internationally Important Populations** | |
|---|---|
| Grey Plover† *Pluvialis squatarola* | 1,704 (<1% of the population) |
| Shelduck *Tadorna tadorna* | 4,464 (1.5% of the North-western Europe population) |
| Redshank *Tringa totanus* | 4,632 (3.6% of the Eastern Atlantic Wintering population) |
| Northern Lapwing† *Vanellus vanellus* | 22,765 (<1% of population) |
| **On passage Species Population** | |
| Sanderling† | 818 (<1% of the population) |
| Dunlin | 20,269 (1.5% of the Northern Siberia/Europe/Western Africa population) |
| Red Knot | 18,500 (4.1% of the North-eastern Canada/Greenland/Iceland/North-western Europe population) |
| Ringed Plover† | 1,766 (<1% of the population) |
| Black-tailed Godwit | 915 (2.6% of the Icelandic Breeding population) |
| Whimbrel† *Numenius phaeopus* | 113 (<1% of the population |
| Grey Plover† | 1,590 (<1% of the population) |
| Greenshank† *Tringa nebularia* | 77 (<1% of the population) |
| Redshank | 7,462 (5.7% of the Eastern Atlantic Wintering population) |
| **Internationally Important Assemblage of Waterfowl** | |
| Waterfowl assemblage | 153,934 waterfowl |
| †Species with this symbol do not represent a population that is > 1% of the international threshold but are included in the waterfowl assemblage. | |

## Table A-2: Qualifying marine features of the Humber Estuary Ramsar Site (Ref 1-4)

| Ramsar Criterion | |
|---|---|
| Criterion 1 – Natural wetland habitats that are of international importance | |
| The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | |
| Criterion 3 – Supports populations of plants and/or animal species of international importance | |
| The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. | |
| Criterion 5 – Bird Assemblages of International Importance | |
| Wintering waterfowl | 153,934 waterfowl (5-year peak mean 1998/99-2002/3) |
| Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance | |
| Species | Spring/Autumn Population (5-year peak mean 1996-2000) |
| Golden Plover | 17,996 (2.2% of the Iceland & Faroes/East Atlantic population) |
| Red Knot | 18,500 (4.1% of the West & Southern African wintering population) |
| Dunlin | 20,269 (1.5% of the West Siberia/West Europe population) |
| Black-tailed Godwit | 915 (2.6% of the Iceland/West Europe population) |
| Redshank | 7,462 (5.7% of the population) |
| Species | Wintering Population (5-year peak mean 1996/7-2000/1) |
| Shelduck | 4,464 (1.5% of the North-western Europe Population) |
| Golden Plover | 30,709 (3.8% of the Iceland & Faroes/East Atlantic population) |
| Red Knot | 28,165 (4.1% of the West & Southern African wintering population) |
| Dunlin | 22,222 (1.7% of the West Siberia/West Europe population) |
| Black-tailed Godwit | 1,113 (3.2% of the Iceland/West Europe population) |
| Bar-tailed Godwit | 2,752 (2.3% of the West Paleartic population) |
| Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path | |
| The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas. | |

1.2.4 The Greater Wash SPA is designated for a range of seabird and diving bird species and is located approximately 20km from the Project. Qualifying features of this site is shown in **Table A-3**.

**Table A-3: Qualifying marine features of the Greater Wash SPA**

| | |
|---|---|
| **Internationally Important Populations** | |
| **Internationally Important Populations of Regularly Occurring Annex 1 Species** | |
| Breeding Species Population | |
| Little Tern *Sternula albifrons* | 798 pairs (42% of GB breeding population) |
| Common Tern *Sterna hirundo* | 510 pairs (5.1% of GB breeding population) |
| Sandwich Tern *Sterna sandvicensis* | 852 pairs (35% of GB breeding population) |
| Wintering Species Population | |
| Little Gull *Hydrocoloeus minutus* | 1,255 (no current GB population estimate) |
| Red-throated Diver *Gavia stellata* | 1,407 (8.3% of GB non-breeding population) |
| **Internationally Important Populations of Regularly Occurring Migratory Species** | |
| Common Scoter *Melanitta nigra* | 3,449 (0.6% of biogeographic population) |

1.2.5 The Wash and North Norfolk Coast SAC supports common seal *Phoca vitulina* as a qualifying feature. This site is located over 75km from the Project but it is acknowledged that there could be potentially connectivity between the Wash and North Norfolk Coast SAC and the Humber Estuary with respect to common seal movements.

## 1.3 Marine ecology features

### Data and information sources

1.3.1 Current baseline conditions have been determined by a desk-based review of available information. A project-specific subtidal benthic survey has also been undertaken to characterise seabed habitats and species within and near to the proposed dredge footprint.

1.3.2 The main desk-based sources of information that have been reviewed to inform the current baseline description within the vicinity of the Project include:

### Benthic habitats and species

- Recent Port of Immingham Benthic Surveys between the Immingham Oil Terminal and Eastern Jetty. This included ten intertidal stations sampled in September 2021 using a 0.01 $m^2$ hand-held core and ten subtidal stations that were sampled in September 2021 using a 0.1 $m^2$ Day Grab. In addition, six stations were sampled at dredge disposal sites HU060 and HU056 in September 2021 using a 0.1 $m^2$ Day Grab (four within each of the disposal sites and two nearby to each of the disposal sites);
- Able Marine Energy Park Benthic Surveys: The results of intertidal benthic surveys (undertaken in 2015 and 2016) using a 0.01 $m^2$ core sample and a subtidal survey in 2016 using a 0.1 $m^2$ Day Grab in the North Killingholme area (Ref 1-5);
- Humber Estuary SAC Intertidal Sediment Survey: Ecological survey work undertaken in 2014 to monitor and assess the intertidal mudflat and sandflat communities of the Humber Estuary (Ref 1-6);
- Immingham Outer Harbour ("IOH") Benthic Surveys: Intertidal sampling at 14 stations (using a Day Grab (0.06 $m^2$) or Van Veen Grab (0.03 $m^2$) and subtidal sampling at 17 stations in the Port of Immingham area in 2009 (Ref 1-7);
- South Humber Channel Marine Studies: Benthic sampling in the intertidal (using a 0.01 $m^2$ core from 36 stations) and subtidal (0.1 $m^2$ Hamon grab from 30 stations) between the Humber Sea Terminal and Immingham Port undertaken in 2010 (Ref 1-8);
- HU056 Disposal Site Monitoring: Benthic invertebrate samples collected at five sites within the disposal sites and at six locations nearby (triplicate samples at all locations) in 2017 (Ref 1-9); and
- Clay Huts Disposal Site Benthic Monitoring: Benthic invertebrate samples collected from four stations in 2008 from within and near to the Clay Huts disposal sites (Ref 1-7).

1.3.3 Site specific surveys that have been undertaken to underpin the assessments include:

- **Subtidal benthic sampling:** Eight subtidal stations were sampled in July 2022 (using a 0.1$m^2$ Day Grab) within and near to the Project footprint. The location of the survey stations is shown in **Figure A-2**. All the samples collected were analysed for macrofaunal analysis (faunal composition, abundance and biomass), Particle Size Analysis (PSA) and Total Organic Carbon (TOC). The methods and results of these surveys are included in **Appendix 9.A of Chapter 9 of the ES [TR030008/APP/6.4]** and summarised in this appendix.

Lamprey

- Review of fish population data in the Humber Estuary: A review of available data to describe the fish populations in the Humber Estuary (Ref 1-10);

Seals

- Donna Nook Seal Counts: The latest pup counts available from the Lincolnshire Wildlife Trust for winter 2021/22 and 2020/21;
- Distribution maps of cetacean and seabird populations in the North-East Atlantic: Distribution maps of cetaceans and seabirds based on survey data in the North-East Atlantic between 1980 and 2018 collated and standardised (Ref 1-11);
- At-sea Distribution Data for Grey and Harbour Seals: The latest habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles (including the Humber Estuary region) estimated using data from animal-borne telemetry tags by the Sea Mammal Research Unit (SMRU) (Ref 1-12);
- Donna Nook Telemetry Data; The results of the tagging of 11 grey seals from the Donna Nook colony to understand the movements of grey seals in the region (Ref 1-13);
- Special Committee on Seals (SCOS) Annual Report: Information on the status of seals around the UK coast is reported annually by the SMRU advised SCOS (Ref 1-14);

**Benthic habitats and species**

Humber Estuary overview

1.3.4 The Humber Estuary supports a wide variety of marine habitats including intertidal mudflats and sandflats, intertidal seagrass beds, coastal lagoons, saltmarsh, reedbeds, subtidal sandbanks and mixed sediment habitats (Ref 1-15; Ref 1-16; Ref 1-6).

1.3.5 The intertidal area of the Humber Estuary is extensive, covering approximately 10,000 ha, of which more than 90% is mudflat and sandflat (Ref 1-17). The largest areas of mudflat occur in the outer Humber Estuary at Spurn Bight and Pyewipe, at Foul Holme and Skitter Sand in the mid Humber Estuary and across most of the Estuary width in the inner estuary above the Humber Bridge. This habitat changes from moderately exposed sandy shores at the mouth of the Humber Estuary to sheltered muddy shores within the main body of the Estuary and up into the tidal rivers. The mid and upper Humber Estuary is characterised by fringing reedbeds *Phragmites australis* on the upper shore while saltmarshes are present along the north bank and on the Lincolnshire coast east of Cleethorpes (Ref 1-17; Ref 1-18; Ref 1-19; Ref 1-6).

1.3.6 The subtidal area of the Humber Estuary is approximately 16,800 ha in extent (Ref 1-17). The subtidal environment of the Humber Estuary is highly dynamic and varies according to the composition of the bottom sediments, salinity, sediment load and turbidity and dissolved oxygen. Many of these factors vary with the season or state of the tide. Subtidal sand (including muddy sand) is the predominant subtidal sediment type in the Humber Estuary. The high mobility of sediments and high turbidity means that this habitat is typically relatively impoverished with a limited fauna characterised by very low densities of opportunistic species and species adapted to these conditions (Ref 1-18; Ref 1-19; Ref 1-17).

1.3.7 Invasive marine species known to occur in the Humber Estuary region include slipper limpet *Crepidula fornicata*, Chinese mitten crab *Eriocheir sinensis*, Pacific oyster *Magallana gigas* and acorn barnacle *Austrominius modestus* (Ref 1-16; Ref 1-8; **Appendix 9.A of Chapter 9 of the ES [TR030008/APP/6.4]**).

Intertidal habitats and species in the Port of Immingham area

1.3.8 Intertidal benthic surveys undertaken in the Port of Immingham area in 2021 recorded sandy mud habitat with the number of taxa found in the samples ranging from four to 15. The number of individuals was also highly variable and ranged from 1,100 organisms per m² to 40,600 organisms per m². The samples were predominantly characterised by nematodes, the oligochaetes *Tubificoides benedii* and Enchytraeidae spp., the mud shrimp *Corophium volutator*, the mudsnail *Peringia ulvae*, Baltic tellin *Limecola balthica* as well as the polychaetes *Hediste diversicolor* and *Pygospio elegans* recorded in the samples. These species dominated the assemblage and contributed almost entirely to the total abundances of organisms recorded at most of the sites surveyed.

1.3.9 The assemblage recorded was considered typical of the community recorded on mudflats in the nearby area (Ref 1-7; Ref 1-8; Ref 1-5). For example, intertidal surveys at North Killingholme (located approximately 3km from the Project) in 2015 and 2016 also recorded a benthic assemblage characterised by species such as *Corophium volutator, Tubificoides benedii, Pygospio elegans, Hediste diversicolor, Limicola balthica* and nematodes with a broadly similar total number of individuals in the samples (up to around 50,000 organisms per m²) (Ref 1-5).

1.3.10 Many of the species recorded in the samples are considered prey species for coastal waterbirds such as polychaetes, Baltic tellin *Limecola balthica*, mudsnail *Peringia* spp. and mudshrimp *Corophium* spp. (Ref 1-20; Ref 1-21).

Project specific subtidal benthic surveys

1.3.11 In order to characterise the subtidal benthic communities present in the vicinity of the Project, subtidal sampling was undertaken in July 2022.

1.3.12 At each station, a sample was analysed for macrofaunal analysis (faunal composition, abundance and biomass), PSA and TOC.

1.3.13 The results of these project specific benthic surveys are summarised below in **Table A-4** with the methods and results described in more detail in **Appendix 9.A of Chapter 9 of the ES [TR030008/APP/6.4]**.

1.3.14 The sediment from samples collected from the area consisted of mud and sandy mud. The TOC in the samples ranged between approximately 3% and 6% (**Table A-4**).

1.3.15 The samples collected were highly impoverished with the number of taxa found in the samples ranging from one (Station 3) to 8 (Station 1), and the number of individuals from 10 organisms per m² (Station 3) to 190 organisms per m² (Station 1). The range in total species biomass in the samples was between <1 and 1.8 grams per m².

### Table A-4: Subtidal benthic survey results

| Station | Sediment Type | TOC (%) | No. of Taxa (per m²) | No. of Individuals (per m²) | Total Biomass (g per m²) | Key Characterising Species (Number per m² Shown in Brackets) | |
|---|---|---|---|---|---|---|---|
| 1 | Mud | 6.45 | 8 | 190 | 0.02 | *Tubificoides swirencoides*<br>*Nephtys* spp<br>*Diastylis rathkei*<br>Nematoda<br>*Streblospio shrubsolii*<br>*Corophium volutator*<br>*Macoma balthica*<br>*Nephtys hombergii* | (60)<br>(40)<br>(20)<br>(20)<br>(20)<br>(10)<br>(10)<br>(10) |
| 2 | Mud | 6.34 | 2 | 30 | 0.05 | Nematoda<br>*Diastylis rathkei* | (20)<br>(10) |
| 3 | Mud | 5.37 | 1 | 10 | <0.01 | *Streblospio shrubsolii* | (10) |
| 4 | Sandy Mud | 4.38 | 2 | 120 | 0.06 | *Nepthys* spp<br>*Diastylis rathkei* | (110)<br>(10) |
| 5 | Sandy Mud | 3.07 | 2 | 70 | 0.03 | *Nepthys* spp<br>*Scoloplos armiger* | (60)<br>(10) |
| 6 | Sandy Mud | 3.77 | 5 | 100 | 1.79 | *Nepthys* spp<br>*Arenicola marina*<br>*Austrominius modestus*<br>*Scoloplos armiger* | (60)<br>(10)<br>(10)<br>(10) |
| 7 | Sandy Mud | 4.50 | 3 | 80 | 0.11 | *Nepthys* spp<br>*Diastylis rathkei*<br>Nematoda | (40)<br>(20)<br>(20) |
| 8 | Sandy Mud | 3.67 | 4 | 110 | 0.03 | *Nepthys* spp<br>*Mytilus edulis*<br>Nematoda<br>*Tubificoides swirencoides* | (80)<br>(10)<br>(10)<br>(10) |

1.3.16 The faunal samples were characterised by low numbers of species (occurring in low abundances) including polychaetes (such *Nephtys* spp, *Streblospio shrubsolii* and *Scoloplos armiger*), nematodes, oligochaetes *Tubificoides* spp and crustacean *Diastylis rathkei*. All the species recorded from the samples in this area were considered commonly occurring in the region and not protected.

1.3.17 The faunal assemblage recorded is considered characteristic of subtidal habitats in this section of the Humber Estuary. For example, subtidal benthic surveys undertaken in the Immingham area in 2009, 2010, 2016 and 2021 predominantly recorded mud or muddy sand habitat which was generally impoverished (with a low number of taxa occurring at the majority of sites). The most commonly recorded infaunal species (generally recorded in low abundances) were the polychaetes *Capitella capitata*, *Streblospio shrubsolii, ,Pygospio elegans, Polydora cornuta*, oligochaetes *Tubificoides* spp., mud shrimp *Corophium volutator*, and nematodes (Ref 1-7; Ref 1-8; Ref 1-5).

Subtidal habitats and species at the disposal site

1.3.18 Dredge material will be deposited at either the Clay Huts disposal site (HU060) or Holme Channel disposal site (HU056).

1.3.19 Benthic surveys undertaken in 2021 within and near to Clay Huts disposal site (HU060) recorded predominantly sand habitat with the samples characterised by a wide range of species but typically in low abundances including nematodes, barnacle *Amphibalanus improvises*, polychaetes (such as, *Pygospio elegans* and *Arenicola* spp.) and the amphipod *Corophium volutator*. Benthic sampling at the Holme Channel disposal site (HU056) recorded sand, gravelly sand and sandy gravel habitat with a highly impoverished assemblage characterised by low abundances of a few species (the amphipod *Corophium volutator*, mysid shrimp *Gastrosaccus spinifer*, bryozoan *Electra monostachys* and springtails *Collembola* spp.) (Ref 1-7).

### Lamprey species

1.3.20 The river lamprey *Lampetra fluviatilis* and the sea lamprey *Petromyzon marinus* are both anadromous species, spawning in freshwater but completing part of their lifecycle in estuaries or at sea. The sea lamprey adult growth phase is short and lasts around two years. In this time, the species is parasitic, feeding on a variety of marine and anadromous fishes, including shad and salmon as well as herring, cod, haddock and basking sharks *Cetorhinus maximus.* Unlike sea lamprey, the growth phase of river lamprey is primarily restricted to estuaries.

1.3.21 River lamprey have been frequently recorded in the Humber Estuary, with the Ouse catchment believed to support one of the most important river lamprey populations in the UK. In the Humber basin, river lamprey mainly enters the rivers from the estuary in autumn and then spawn in April. Fish survey data has also recorded most river lamprey in summer and autumn in the Humber Estuary (Ref 1-10). Most river lamprey were caught in summer and autumn Sea lamprey spawning is almost entirely restricted to the Ouse catchment, principally the Rivers Ouse, Swale, Ure and Wharfe (Ref 1-10).

1.3.22 The spawning migration of sea lamprey usually takes place in April and May when the adults start to migrate back into freshwater. The upstream migration of river lamprey takes place almost exclusively at night, with adults being sedentary and resting under rocks and riverbanks during the day (Ref 1-10).

### Seal species

1.3.23 The most commonly occurring marine mammals recorded in the Humber Estuary region are seals with populations of both grey seal *Halichoerus grypus* and common (harbour) seal *Phoca vitulina* occurring.

1.3.24 The intertidal area at Donna Nook is the main haul out site in the region and is an important breeding ground for grey seals. This colony is located over 25km from the Project at the mouth of the Humber Estuary. In 2019, there were an estimated 67,789 grey seal pups born in Britain (Ref 1-1) with approximately 3% of the pup production occurring at Donna Nook. Breeding occurs once a year between October and December and the vast majority of seals in this colony breed at Donna Nook, with a few seals breeding on Skidbrooke Ridge, south of Donna Nook. Peak grey seal pup numbers in winter 2021/22 and 2020/21 at Donna Nook consisted of 2,122 and 2,214 seals respectively with numbers having increased substantially in recent years from under 100 pups born annually in the 1980s (see **Figure A-3**).

1.3.25 The intertidal mudflats also provide an important habitat throughout the year for grey seals to haul out or rest, particularly during the spring when all grey seals (except young born the previous year) are moulting. Aerial seal counts undertaken in August 2021 recorded 3,897 grey seals hauled out at Donna Nook. Total numbers at this colony have increased from the low hundreds recorded in the late 1990s and early 2000s to counts over 4,000-6,000 seals in more recent years (Ref 1-1) (see **Figure A-4).**

1.3.26 Grey seals can undertake wide ranging seasonal movements over several thousand kilometres (Ref 1-22; Ref 1-12; Ref 1-13). However, while grey seals may range widely between haul out sites, tracking has shown that most foraging probably occurs within 100km of a haul-out site (Ref 1-14). Seals tagged at Donna Nook were recorded undertaking wide ranging movements in the outer Humber Estuary and approaches as well as more widely in the North Sea (Ref 1-13). This is reflected in high predicted at-sea densities of grey seals in the approaches to the Humber Estuary (Ref 1-12).

1.3.27 The Humber Estuary region also supports a small population of common seal. As for the grey seal, Donna Nook is also the key haul out site for common seals. A total of 122 common seals were recorded as part of annual aerial monitoring in the region in August 2021. Since the 1990s, numbers have generally fluctuated between 100 and 400 counts annually in the region (Ref 1-14). Common seals typically forage within 40km to 50km of haul out sites (Ref 1-14).

#### Immingham area

1.3.28 Marine mammal survey data or sighting records for the Immingham area are limited. However, given that seals (particularly grey seals) are regularly recorded foraging in the Humber Estuary, this species would be expected to occur relatively frequently in this area. For example, approximately 10 to 15 grey seals were observed hauling out on mudflat at Sunk Island (on the north bank of the Humber Estuary) during recent benthic surveys as detailed in Ref 1-23. This haul out site is located approximately 4km northeast from the Project and around 3 - 4km from the dredge disposal sites (including transit routes). No seal haul out sites are known to occur nearer to the Project.

## 1.4 Coastal waterbird features

### Data and information sources

1.4.1 Current baseline conditions have been determined by a desk-based review of available information (as well as the field surveys undertaken as set out below):

- Immingham Outer Harbour (IOH) Ornithology Surveys: Data from surveys carried out for a separate development (the IOH) have been used to inform the baseline for this Project as the IOH survey boundary overlaps with the Project area (see **Figure A-5**). The coastal waterbird surveys started in winter 1997/98 and have been ongoing annually since then with winter surveys undertaken between October and March twice a month. During each survey, either four counts (November to February) or five counts (other months) are undertaken every two hours after high water. The most recent 5-years of data (2018/19 to 2022/23) has been analysed. In addition, the 2021/22 survey season started in August rather than October. The surveys have been continued on a monthly basis throughout 2022 rather than stopping in March as per previous years. On this basis, the results from surveys covering passage and summer months (August and September 2021 and April to September 2022) have also been presented;
- Wetland Bird Survey (WeBS) Core Counts Data: Core count data for “Immingham Docks - Sector K” (ID 38905) which overlaps with the Project. These surveys are typically undertaken around high water. The most recent 5-years of data available from the British Trust for Ornithology (BTO) (2017/18 to 2021/22) has been analysed. In addition, estuary wide WeBS data for the Humber Estuary for 2017/18 to 2021/22 has also been reviewed to provide contextual information (Ref 1-24);
- Natural England Designated Sites Portal: Background information on the ecology of SPA qualifying bird species in the Humber Estuary (Ref 1-25);
- Population Trends for Species in the Humber Estuary: Information on long-term trends in the population status of waterbirds in the Humber Estuary is available for the period up to 2016/2017 from the latest WeBS “Alerts Report” (Ref 1-26). This is an information source describing waterbird numbers on protected areas and has an ‘alert system’ where species that have undergone major declines in numbers are identified; and
- BTO Research Report Analysing WeBS data for the Humber Estuary: Population trends of waterbird species in different parts of the Humber Estuary for the period 2000/01 to 2016/17 (Ref 1-27).

### Humber Estuary overview

1.4.2 The Humber Estuary is a site of national and international importance for its waders and wildfowl (ducks and geese) populations, regularly supporting over 130,000 waterbirds during winter and passage periods (Ref 1-24; Ref 1-27).

1.4.3 Waterbird numbers are highly variable in the Humber Estuary throughout the year, but it is considered to be an important site year-round due to the presence of different populations of wintering, passage and breeding birds which move into and out of the estuary. In general, numbers of coastal waterbirds are at their lowest during June, when the assemblage is dominated by wildfowl, before numbers start increasing during July due to the return of waders such as Dunlin. Golden Plover starts to become more abundant in late summer. The arrival of wintering waterfowl such as Pink-footed Geese and Wigeon as well as wader species such as Knot typically occurs in early autumn. Numbers start to fall in late winter with the departure of species such as Golden Plover and Knot, before increasing slightly in spring as passage flocks start to move through the area and wildfowl depart (Ref 1-25).

1.4.4 **Table A-5** provides summary ecology information on key waterbird species occurring in the Humber Estuary in intertidal and marine habitats. This includes the 5-year estuary-wide mean peaks for these species for 2017/18 to 2021/22 (the most recent 5-years of data available from the BTO) (Ref 1-24).

**Table A-5: Summary information for key species of coastal waterbird in the Humber Estuary**

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| Wader | Golden Plover | Roosts but rarely feeds in the intertidal | Mainly insects, especially beetles, as well as other invertebrates and some plant material. | Golden Plover mainly uses the estuary to roost in areas including Alkborough Flats, Whitton Sands, Blacktoft Sands, Read's Island in the Inner Humber Estuary and Salt End, Stone Creek, Paull Holme Stray, Cherry Cobb Sands and Pyewipe in the Middle Humber. | Oct-Dec | 20,812 |
| | Knot | Intertidal benthivore | Mainly molluscs, including the bivalve *Limecola balthica*, cockles *Cerastoderma edulis* and mud snail *Peringia ulvae*, the latter especially in early winter. Diet proportions of 75% bivalves, 1% worms and 24% "other". Prey is eaten whole and crushed within the gizzard. | Knot is found in the outer Humber including Cherry Cobb Sands and the Lincolnshire coast south of Grimsby. Easington Lagoons provide an important roost site for Knot during high spring tides. | Jan, Oct-Dec | 26,428 |
| | Lapwing | Roosts but rarely feeds in the intertidal | Wide range of invertebrates including beetles and earthworms. | Lapwing mainly uses the estuary to roost in areas including Alkborough Flats, Whitton Sands, Blacktoft Sands and Read's Island in the Inner Humber Estuary as well as Salt | Jan-Feb, Nov-Dec | 15,247 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | | | | End, Stone Creek, Paull Holme Stray, Cherry Cobb Sands and Pyewipe (all Middle Humber Estuary). The majority of feeding occurs inland, though some feeding on intertidal areas takes place during July to September. | | |
| | Dunlin | Intertidal benthivore | Oligochaetes, polychaete worms (such as *Hediste diversicolor, Nephtys* spp., *Pygospio elegans* and *Scoloplos armiger*), bivalves (such as *Limecola balthica*) and the mud snail *Peringia ulvae*. Diet proportions of 70% worms, 14% bivalves and 16% "other". | Widespread with important areas including Read's Island (Inner Humber Estuary), Cherry Cobb Sands, Pyewipe, Stone Creek and Salt End (all Middle Humber Estuary) and Saltfleet (Outer Humber Estuary). | Aug, Nov | 17,634 |
| | Oystercatcher | | Predominantly bivalves especially large cockles *Cerastoderma edule*, mussels *Mytilus edulis* and tellins *Limecola* spp. Diet might also include polychaete worms on mudflats and earthworms from wet fields. | Found predominantly in the Outer Humber Estuary. The most important areas for Oystercatcher are along the Lincolnshire coast. | Feb, Aug-Nov | 5,806 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | Black-tailed Godwit | | Invertebrates, including beetles, polychaete worms (such as *Hediste diversicolor, Nephtys, Pygospio elegans* and *Scoloplos armiger*), molluscs (such as *Limecola balthica)* crustaceans and some plant material. | Key areas include Pyewipe and North Killingholme Haven Pits for this species during winter. | Aug-Oct | 5,646 |
| | Grey Plover | | Polychaete worms (such as *Hediste diversicolor* and *Arenicola marina*), bivalves (such as *Limecola balthica*) and the muds snail *Peringia ulvae.* | Widespread usage across the Middle and Outer parts of the Humber Estuary. Typically, more usage of the north bank compared to the south bank. Particular key areas include Cherry Cob Sands, and Welwick. | Jan, Sep-Oct | 2,985 |
| | Redshank | | Polychaete worms (such as *Hediste diversicolor, Nephtys spp., Pygospio elegans and Scoloplos armiger*), the bivalve *Limecola balthica,* crustaceans (such as brown shrimp *Crangon crangon and* mud shrimp *Corophium* spp.*) and* the mud snail *Peringia ulvae*. Will also consume terrestrial | Widespread with key areas including Cherry Cobb Sands and in the outer Humber Estuary. | Sep, Nov-Dec | 2,659 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | | | invertebrates, including insects and spiders. Diet proportions of 46% worms, 7% bivalves and 47% "other". | | | |
| | Curlew | | Primarily bivalves (such as *Cerastoderma edule* and *Limecola balthica*), the ragworm *Hediste diversicolo*r and lugworm *Arenicola marina*. Earthworms on terrestrial habitats, Diet proportions during winter of 46% bivalves, 35% worms and 19% "other". | Important areas include Cherry Cobb sands and Patrington to Easington (Outer North), Read's Island (Inner Humber), Pyewipe, Salt End (both Middle Humber) and Theddlethorpe St. Helen (Outer South). | Jan, Oct, Dec | 2,544 |
| | Avocet | | Benthic crustaceans e.g. *Corophium* spp. and worms such as ragworm *H. diversicolo*r. Insects, especially Chironomidae larvae, in freshwater habitats. | Largest wintering flocks are present in the inner Humber around Far Ings/Read's Islands, close to the favoured locations for breeding. | Aug-Sep | 2,576 |
| | Bar-tailed Godwit | | Polychaete worms are the principal food source during winter such as *Hediste diversicolor, Nephtys, Pygospio elegans and Scoloplos armiger*. Diet proportions comprise 94% | The most important sectors for Bar-tailed Godwit are the three sectors that make up the Outer (North) area, and the adjacent Cherry Cobb Sands (Middle | Feb, Sep, Nov-Dec | 1,867 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | | | worms. Other species sometimes consumed include the shrimp *Crangon crangon* and bivalve *Limecola balthica*. | Humber), and Paull Holme Strays (also Middle Humber). | | |
| | Ringed Plover | | In winter, mainly marine worms, crustaceans (such as *Corophium* spp.) and molluscs (such as *Peringia ulvae*). | Most commonly recorded in the Outer Estuary. | Aug-Sep | 1,070 |
| | Sanderling | | Polychaete worms (such as *Hediste diversicolor*), crustaceans and insects. Diet proportions comprise 60% worms, 1% molluscs and 39% “other”. | Within the Humber Estuary, Sanderling are found exclusively in the outer estuary, particularly on the sandflats of the Lincolnshire coast. | Feb, May, Aug, Nov-Dec | 575 |
| | Turnstone | | A wide range of invertebrates and other food sources. This includes polychaete worms and mudshrimp *Corophium* spp. on mudflats. Also feeds on rocky shore species, including mussels, amphipods, molluscs (such as periwinkles) and crabs. Diet proportions comprise 20% bivalves, 5% worms and 75% “other”. | Key areas for Turnstone include rocks around New Holland between Barton upon Humber and East Halton (Middle Humber) and between Grimsby and Cleethorpes (Outer South). Also feed on jetties and around the harbours. | Feb, Oct-Dec | 287 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | Whimbrel | | On passage the species consumes shrimps, molluscs, worm and crabs. | No obvious preferred areas, found throughout the Humber during migration periods. | Jul-Aug | 58 |
| | Ruff | Intertidal benthivore on mudflats but omnivores more generally | Omnivore feeding on insects, larvae, frogs, small fish and seeds. | The Humber Estuary is considered an important site for passage Ruff. The most important areas of the Humber for the ruff are the intertidal mud and sand flats and adjacent lagoons of Alkborough Flats and Blacktoft Sands with smaller numbers also observed wintering along the River Trent, at North Killingholme and at Tetney). During autumn, Paull Holme Strays, Sunk Island, Read’s Island, New Holland and Whitgift Sand on the River Ouse are also important areas. | Aug-Oct | 76 |
| Water-fowl | Pink-footed Goose | Herbivorous waterfowl | Herbivorous. Outside the breeding season this species feeds on improved grasslands, cereal stubbles and vegetables (e.g. potatoes, sugar beet, carrots). | Recorded mainly on Read’s Island, which it uses as a roosting site, flying inland during the day to feed in fields. | Oct-Nov | 25,332 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | Shelduck | Intertidal benthivore | Invertebrates, with small molluscs predominant in north and west Europe, especially mud snail *Peringia* spp. Other species consumed include the mud shrimp *Corophium volutator*, bivalves and polychaetes. | Shelduck are found throughout the estuary with key areas including Read's Island and Alkborough Flats (Inner Humber) and at Pyewipe, Salt End, Cherry Cobb Sands and Paull Holme Sands (Middle Humber). | Jul, Oct-Nov | 6,486 |
| | Teal | Omnivorous waterfowl | Seeds of saltmarsh and other wetland plants, including glasswort Salicornia spp. and oraches *Atriplex* spp., and invertebrates (especially small oligochaetes) sifted from the benthos. | Key areas include Alkborough Flats, Read's Island and Blacktoft Sands. | Oct-Nov | 5,286 |
| | Dark-bellied Brent Goose | Herbivorous waterfowl | Mainly grasses, and on arable land the shoots of winter cereals, and oilseed rape. On estuaries, eelgrass *Zostera* spp. and saltmarsh plants. | The North Lincolnshire coast between Tetney and Donna Nook is a key area. Spurn is also important during spring passage. | Jan, Nov-Dec | 2,645 |
| | Wigeon | | Plants (leaves, stems, stolons, bulbils and rhizomes). | Alkborough Flats and Read's Island as well as Faxfleet to Brough Haven (also Inner Humber) are key areas. | Jan-Feb, Oct-Nov | 3,669 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | Greylag Goose | | Grass, roots, cereal leaves and spilled grain. | Present within the Inner Humber to a greater extent (e.g. Faxfleet). Present in greatest numbers close to freshwater pools. | Aug-Nov | 1,796 |
| | Mallard | Omnivorous waterfowl | Omnivorous, including both plants and animal matter. | Occurs throughout Humber Estuary, with key areas including the River Ouse and Cherry Cobb Sands. The area around the outfall at New Holland is also a favoured area where the birds feed on grain spill from the dock. | Jan, Aug-Sep, Nov | 1,109 |
| | Barnacle Goose | Herbivorous waterfowl | The leaves and stems of grasses, roots and seeds. | Present on fields/arable land around the entire Humber Estuary in low densities. | Jan-Mar, Sep, Dec | 755 |
| | Common Scoter | Benthivorous diving duck | Molluscs. | Present within the Outer Humber due to their more pelagic lifestyle. Occurs in passage and winter. | Mar, Sep-Oct, Dec | 408 |
| | Canada Goose | Herbivorous waterfowl | Roots, grass, leaves and seeds. | Occurs within the Inner Humber in the largest numbers. Present in greatest numbers close to freshwater pools. | Aug-Sep | 691 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | Goldeneye | Benthivorous diving duck | Mostly aquatic insects, molluscs and crustaceans. Occasional fish. Plant material generally less than 25%. | Goxhill to New Holland and Barrow to Barton (including Barton Pits) are key areas. | Nov-Dec | 299 |
| Gull | Black-headed Gull | Omnivorous/ scavenging gull | Worms, insects, small fish, crustacea and carrion. | Widely distributed. | Aug-Oct | 13,018 |
| | Common Gull | | Worms, insects, fish and carrion. | Widely distributed. | Feb, Sep-Oct, Dec | 1,293 |
| | Herring Gull | | Carrion, offal, seeds, fruits, young birds, eggs, crustaceans, small mammals, insects and fish. | Widely distributed. | Feb, Apr, July, Sep, Dec | 1,334 |
| | Great Black-backed Gull | | Shellfish, birds and carrion. | Widely distributed. | Feb, Nov-Dec | 213 |
| Terns, and other diving birds | Sandwich Tern | Piscivorous plunge diver | Fish such as sandeels, sprats and whiting. | Widely distributed. | Jul-Aug | 578 |
| | Common Tern | | Fish and crustaceans in some areas. | Widely distributed. | Aug-Sep | 247 |

| Species group | Species | Feeding behaviour in the marine environment [1] | Diet [2] | Distribution in the Humber Estuary [3] | Month of peak count [4] | WeBS Core Count 5-year estuary-wide mean peaks (2017/18 to 2021/22) [5] |
|---|---|---|---|---|---|---|
| | Cormorant | Piscivorous pursuit diver | Feeds on fish such as flatfish, blennies gadoids, sandeel, salmonid and eels. | Widely distributed. | Jan-Mar, Nov | 438 |
| | Red-throated Diver | Piscivorous pursuit diver | Diet consists predominantly of fish (mainly clupeids, mackerels, flatfish, gadoids and sand eels). | Recorded mainly in the outer Humber Estuary and approaches. | Jan, Oct, Dec | 33 |

1. Feeding behaviour based on Ref 1-28 and Ref 1-29:

    Intertidal benthivore: Waterbird species feeding on infaunal and/or epibenthic invertebrates in intertidal habitats;

    Herbivorous waterfowl: Geese, swans and ducks feeding on plant material;

    Omnivorous waterfowl: Ducks feeding on a range of animal and plant food;

    Benthivorous diving duck: Diving ducks/seaducks feeding on epibenthic and infaunal invertebrates on the seabed;

    Omnivorous/scavenging gull: Gulls feeding on a range of animal and plant food including through scavenging;

    Piscivorous plunge diver: Seabirds foraging for fish through plunge diving; and

    Piscivorous pursuit diver: Seabirds foraging for fish through pursuit diving.

2. Based on Ref 1-30; Ref 1-31 and Ref 1-32.
3. Based on Ref 1-31 and Ref 1-33.
4. Months when peaks count occurred in the 2017/18 to 2021/22 estuary-wide BTO Core Counts (Ref 1-24).
5. Data from Ref 1-24.

1.4.5 The most abundant wading bird species recorded in the Humber Estuary are Knot and Golden Plover (5-year mean peak for 2017/18 to 2021/22 of 26,428 and 20,812 birds respectively). Other wading birds occurring in large numbers include Lapwing (5-year mean peak of 15,247 birds) and Dunlin (5-year mean peak of 17,634 birds) as well as Oystercatcher, Black-tailed Godwit, Grey Plover, Curlew, Avocet and Bar-tailed Godwit (Ref 1-24). Important areas for feeding and roosting waders include the Pyewipe frontage on the south bank and Paull Holme, Cherry Cobb, Foulholme, Spurn and Sunk Island Sands on the north bank of the Humber Estuary. In the inner section of the Humber Estuary, sites such as Blacktoft Sands, Alkborough and Read's Island Flats are considered important (Ref 1-25). The numbers of different waders in the Humber Estuary can show a high degree of interannual variation with some species (such as Black-tailed Godwit, Avocet, Oystercatcher) showing an overall long-term increase in estuary wide numbers with other species such as Dunlin, Redshank and Knot showing an overall decline (Ref 1-31; Ref 1-26).

1.4.6 Key prey items for waders on the Humber Estuary include annelid worms (such as *ragworm Hediste diversicolor, lugworm Arenicola marina, Pygospio elegans, Streblospio shrubsolii, Tubificoides spp., and Nephtys spp), the bivalves Cerastoderma edule and Limecola balthica, the mudsnail Peringia spp. and mud shrimp Corophium spp* (Ref 1-30; Ref 1-31).

1.4.7 The most abundant wildfowl bird species recorded in the Humber Estuary are Pink-footed Goose and Shelduck (5-year mean peak of 25,332 and 6,486 birds respectively). The number of Shelduck in the Humber Estuary has remained relatively stable with Pink-footed Goose showing a long-term increase (Ref 1-27; Ref 1-26). Other commonly occurring wildfowl include Teal, Dark-bellied Brent Geese, Wigeon, Greylag Goose and Mallard (Ref 1-24). Pink-footed Goose are recorded in large numbers at Read's Island with Dark-bellied Brent Geese and Wigeon, principally occur in areas along the southern shore from Cleethorpes to Saltfleetby (Ref 1-25).

1.4.8 Black-headed Gull (5-year mean peak of 13,018 birds) as well as Herring Gull and Common Gull (occurring in lower numbers) are widespread in the Humber Estuary.

1.4.9 The Humber Estuary also supports several heron species including Grey Heron, Little Egret and Great Bittern. Grey Heron and Little Egret are recorded in a wide variety of intertidal and coastal habitats with Great Bittern recorded within reedbed habitats such as around Blacktoft Sands, Far Ings, Barton and North Killingholme Haven clay pits (Ref 1-25).

1.4.10 Diving birds occurring in the Humber Estuary include Common Scoter and Goldeneye (5-year mean peak of 408 and 299 birds respectively) with Cormorants and Tufted Duck also occurring in relatively large numbers.

1.4.11 Little Tern breed at Easington Lagoon, which is located approximately 20km from the Project (Ref 1-25), with data suggesting this species forages within 5km of nesting sites (Ref 1-34. Sandwich Tern (5-year mean peak of 578 birds) and Common Tern (5-year mean peak of 247 birds) are also regularly recorded, particularly in passage periods in the Humber Estuary.

Coastal waterbirds on the foreshore in the Immingham area

1.4.12 Pre and post consent monitoring of coastal waterbird surveys as part of the IOH development have been undertaken annually since winter 1997/98. The foreshore in the area of the Project overlaps with 'Sector C' (between the Immingham Oil Terminal Jetty and Oldfleet Drain (as shown in **Figure A-5**). The most recent 5-years of data (2018/19 to 2022/23) has been analysed for this sector (**Table A-6**). During this period, surveys were undertaken between October and March twice a month. During each survey, either five counts (October and March) or four counts (November to February) were undertaken every two hours after high water. In addition, the 2021/22 survey season started early in August rather than October. The surveys have continued on a monthly basis in 2022 rather than stopping in March as per previous years. On this basis, the results from passage and summer months (August and September 2021 and April to September 2022) have been presented separately (**Table A-7**). **ANNEX A.1** presents monthly peak counts for the period October 2021 to September 2022 in Sector C. In order to provide contextual information on bird numbers in the wider area, **Annex A.2** provides a summary of bird data for Sector A and B (the location of these sectors are shown in **Figure A-5**).

1.4.13 To summarise the findings from the survey work, the annual peak count (maximum count from each winter period between October and March) for birds feeding, roosting as well as the combined total[1] is presented in **Table A-6**. The 5-year average of the annual peak counts for each species (referred to as the mean peak)[2] is also presented in **Table A-6**. This table also compares the 5-year mean peak against the thresholds and values outlined below, to provide objective criteria to help determine the value of the area in an international, national and regional context:

a. **Internationally Important Threshold Level**: The threshold for an individual species (or subspecies) is set at 1% of the biogeographic population[3];

b. **Nationally Important Threshold Level:** The threshold for an individual species (or subspecies) is set at 1% of the British population i.e. if a site

1 The combined peak count is a summed value derived from the largest count of both feeding and roosting birds during the same hourly count.

2 It is standard practice to present the average of the annual peaks for a certain duration of time (sometimes referred to as the mean of peaks). This is calculated as the average of the maximum annual counts and for the most recent 5-years of available data if possible. Mean peaks (using five years of winter values) is the approach presented in the WeBS annual reports. For most migratory species, the WeBS 5-year mean of peak is also the value that is used when identifying qualifying features for each SPA. Using mean of peaks is also useful for characterising the relative importance of sectors within a site, as it gives a good indication of how many individuals of a given species a sector typically supports (Ref 1-35).

3 The thresholds levels are available at: https://www.bto.org/volunteer-surveys/webs/data/species-threshold-levels. It should be noted that, where 1% of the population is less than 50 birds, 50 is normally used as a minimum qualifying threshold for the designation of sites of national or international importance (accessed 04/04/23) (Ref 1-36).

supports more than 1% of the British population it is considered Nationally Important (for that species or subspecies); and

c. **Latest Humber Estuary WeBS Core Counts 5-year average:** The 5-year mean peak from the latest Humber Estuary WeBS Core Counts. Core Count surveys are typically undertaken around high water. Within this assessment, this is from 2017/18 to 2021/22 (Ref 1-24). For the purposes of this assessment, numbers representing more than 10% of the estuary-wide Core Counts for an individual species are considered regionally important and numbers representing between 1% and 10% are considered locally important.[4]

1.4.14 The 5-year mean peak number of birds in Sector C during different winter months is presented in **Figure A-6** to show any seasonal trends over the winter period. The distribution of birds within Sector C based on distribution data collected in the surveys is shown in **Figure A-7**.

1.4.15 During the surveys, over 25 waterbird species have been recorded on the foreshore within Sector C with approximately 20 species considered regularly occurring.

1.4.16 The most numerous wading bird species recorded foraging within the area over this period were Black-tailed Godwit and Dunlin (5-year mean peaks of 1609 and 579 birds respectively). It should be noted that during winter 2018/19 and 2019/20 Black-tailed Godwit were recorded in nationally important numbers (annual peak counts of 944 and 752 birds respectively) and in internationally important numbers in 2020/21 2021/22 and 2022/23 (2016,2591 and 1740 birds respectively) (**Table A-6**). Dunlin were regularly recorded in numbers considered locally important (i.e., representing >1% estuary wide numbers[5]) feeding (annual peak counts ranging from 371 to 842 birds). Other wading birds regularly recorded in numbers considered to be locally important included Bar-tailed Godwit, Curlew, Redshank and Turnstone.

1.4.17 Shelduck were the most abundant wildfowl species recorded foraging (5-year mean peak of 128 birds) with this species recorded in numbers considered to be locally important. Lower numbers of other ducks such as Teal and Mallard were also recorded.

1.4.18 With respect to roosting birds, Black-tailed Godwit was the most numerous species recorded (5-year mean peaks of 574 birds) with internationally important numbers recorded in 2019/20 (1352 birds) and nationally important numbers in 20/21 and 22/23 (700 and 580 birds respectively). Other species regularly recorded roosting included Shelduck and Curlew (5-year mean peak of 32 and 26 birds, respectively) as well as Knot, Redshank and Turnstone.

[4] The 1% local threshold has been requested to be used in the baseline data analysis by Natural England as part of previous developments on the Humber Estuary.

[5] Compared against the estuary-wide WeBS 5-year mean peak (2017/18 to 2021/22).

**Table A-6: Coastal waterbird species recorded as part of the IOH Ornithology Surveys within Sector C during the last five winters**

| Species | Peak count per winter (feeding) | | | | | | Peak count per winter (roosting) | | | | | | Peak count per winter (combined – non-behavioural) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | MP | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | MP | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | MP |
| Avocet | | 42 | 2 | | 3 | 9 | | 64 | | | | 13 | | 64 | 2 | | 3 | 14 |
| Bar-tailed Godwit | 30 | 54 | 45 | 141 | 55 | 65 | 2 | | 3 | | 3 | 2 | 30 | 54 | 45 | 141 | 55 | 65 |
| Black-headed Gull | | | | 83 | 137 | 44 | | | | 76 | 138 | 43 | | | | 83 | 138 | 44 |
| Black-tailed Godwit | 944 | 752 | 2,016 | 2,591 | 1,740 | 1,609 | 1 | 1,352 | 700 | 238 | 580 | 574 | 944 | 1,352 | 2,016 | 2,591 | 1,740 | 1,729 |
| Common Gull | | | | 1 | 15 | 3 | | | | 5 | 47 | 10 | | | | 5 | 47 | 10 |
| Common Sandpiper | | | | | 1 | <1 | | | | | | | | | | | 1 | <1 |
| Cormorant | | | | | 1 | <1 | 1 | | | | 1 | <1 | 1 | | | | 1 | <1 |
| Curlew[†] | 35 | 24 | 35 | 37 | 46 | 35 | 11 | 14 | 57 | 16 | 32 | 26 | 35 | 24 | 57 | 37 | 46 | 40 |
| Dunlin | 371 | 571 | 554 | 556 | 842 | 579 | 9 | 110 | 6 | 4 | 27 | 31 | 371 | 571 | 554 | 556 | 842 | 579 |
| Gadwall | | 1 | | | | <1 | | | | | 2 | <1 | | 1 | | | 2 | <1 |
| Golden Plover | | | | 13 | 1 | 3 | | | 4 | | | <1 | | | 4 | 13 | 1 | 4 |
| Goldeneye | | | | 1 | | <1 | | | | | | | | | | 1 | | <1 |
| Great Black-backed Gull | | | | 1 | 4 | 1 | | | | 2 | 7 | 2 | | | | 2 | 7 | 2 |
| Grey plover[†] | | 11 | 20 | 75 | 12 | 24 | | | 1 | | | <1 | | 11 | 20 | 75 | 12 | 24 |
| Greylag Goose | | | | 2 | | <1 | | | | | | | | | | 2 | | <1 |
| Herring Gull | | | | 13 | 11 | 5 | | | | 8 | 14 | 4 | | | | 13 | 14 | 5 |
| Knot | 191 | 110 | 16 | 39 | 24 | 76 | | 210 | 2 | | | 42 | 191 | 210 | 16 | 39 | 24 | 96 |
| Lapwing[†] | | | | | | | | 1 | | | 1 | <1 | | 1 | | | 1 | <1 |
| Lesser Black-backed Gull | | | | 2 | 1 | <1 | | | | 4 | | <1 | | | | 4 | 1 | 1 |
| Little Egret | | 3 | | | 2 | 1 | | | | | | | | 3 | | | 2 | 1 |
| Little Ringed Plover | | | | | | | | | | 1 | | <1 | | | | 1 | | <1 |
| Mallard[†] | 2 | 3 | | | | 1 | | 2 | 2 | | | <1 | 2 | 3 | 2 | | | 1 |

| Species | Peak count per winter (feeding) | | | | | | Peak count per winter (roosting) | | | | | | Peak count per winter (combined – non-behavioural) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | MP | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | MP | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | MP |
| Mute swan | | | | | | | | | | 1 | 1 | <1 | | | | 1 | 1 | <1 |
| Oystercatcher† | 4 | 9 | 7 | 7 | 5 | 6 | 2 | 2 | 7 | 2 | 4 | 3 | 4 | 9 | 7 | 7 | 5 | 6 |
| Pink-footed Goose | | | | | | | | | 1 | | | <1 | | | 1 | | | <1 |
| Purple Sandpiper | | | | | 1 | <1 | | | | | | | | | | | 1 | <1 |
| Red-breasted Merganser | | | | | 1 | <1 | | | | | | | | | | | 1 | <1 |
| Redshank | 38 | 50 | 48 | 80 | 64 | 56 | 5 | 12 | 13 | 44 | 3 | 15 | 38 | 50 | 48 | 80 | 64 | 56 |
| Ringed Plover† | 3 | 12 | 25 | 2 | 6 | 10 | 1 | 7 | 22 | 16 | 16 | 12 | 3 | 12 | 25 | 16 | 16 | 14 |
| Shelduck | 152 | 125 | 139 | 128 | 96 | 128 | 26 | 64 | 35 | 18 | 15 | 32 | 152 | 125 | 139 | 128 | 96 | 128 |
| Teal† | 8 | 13 | 3 | 3 | 47 | 15 | | | | | 3 | <1 | 8 | 13 | 3 | 3 | 47 | 15 |
| Turnstone† | 15 | 21 | 28 | 35 | 27 | 25 | | 15 | 18 | 23 | 11 | 13 | 15 | 21 | 28 | 35 | 27 | 25 |

SPA qualifying species highlighted in bold. † Species with this symbol are included within the SPA waterfowl assemblage.

| | |
|---|---|
| | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year MP. |
| | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year MP. |
| | Cells highlighted blue indicate the count is of national importance. It should be noted that for Black-tailed Godwit the regional importance (> 10% of the estuary wide WeBS 5-year MP – 565 birds) is higher than the national importance threshold (390 birds). |
| | Cells highlighted red indicate the count is of international importance. |

1.4.19 As shown in **Figure A-6**, during the surveys, the largest numbers of wintering Black-tailed Godwit and Bar-tailed Godwit were typically recorded in October. Shelduck numbers were typically largest from January to early March. The numbers of other wintering species were highly variable with no clear pattern.

1.4.20 The data collected during passage and summer periods (August to September 2021 and April to September 2022) recorded a range of species some of which were recorded in relatively large numbers (**Table A-7**). The number of birds using Sector C was generally higher in the spring months (April to May) than in autumn passage months (August and September) with peak counts of 400 Dunlin and 581 Black-tailed Godwit recorded in the spring and 222 Dunlin and 160 Black-tailed Godwit in the autumn respectively. The count of 581 Black-tailed Godwit exceeded nationally important thresholds. However, counts of these species along with other species including Redshank and Shelduck were typically lower in the passage and summer months than the winter.

1.4.21 All of the species observed in Sector C are frequently recorded in large numbers during both passage and winter periods in the Humber Estuary more widely with the estuary-wide peak abundances of passage birds typically showing a high degree of both monthly and annual variability. This would be expected given the more transient nature of passage birds with numbers fluctuating on a daily basis as birds arrive and depart from sites in the Humber Estuary (Ref 1-27).

1.4.22 Within Sector C, the largest numbers of waterbirds typically occur on mudflat in the east of the sector towards the Pyewipe mudflats near Grimsby. Within this area approximately 500 to 2000 Black-tailed Godwit, 100s of Dunlin as well as lower numbers (<50) of other species such as Shelduck, Redshank and Knot are regularly recorded (**Figure A-7**). Lower numbers are recorded in the western section of Sector C which is described in more detail in the Section below.

1.4.23 The upper shore sea defences in the area are regularly used through the tide by individuals or small flocks of Turnstone (typically < 20 to 30 birds throughout the sector) year round.

1.4.24 The assemblage recorded in the surveys is broadly similar to that recorded during the WeBS Core Counts for the period 2017/18 to 2021/22 (the most recent 5-years of data available from the BTO for the “Immingham Docks Sector K”). The most commonly recorded species were Dunlin (mean peak of 186 birds), Redshank (mean peak of 100 birds), Black-tailed Godwit (mean peak of 40 birds) Shelduck (mean peak of 45 birds), Turnstone (mean peak of 45) and Curlew (mean peak of 12 birds). It is worth noting that this WeBS sector covers a much larger area than Sector C and so it is not directly comparable in terms of spatial extent.[6] Core counts are also only typically undertaken around high water periods and so do not provide information through the tide or during low water periods.

[6] The sector includes foreshore adjacent to the Port of Immingham and also extents east of the IOT terminal jetty (Ref 1-37).

**Table A-7: Coastal waterbird species recorded as part of the IOH Ornithology Surveys within Sector C during August to September 2021 and April to September 2022**

| Species | Peak count per passage/summer month (feeding) | | | | | | | | Peak count per passage/summer month (roosting) | | | | | | | | Peak count per passage/summer (combined – non-behavioural) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aug 21 | Sept 21 | Apr 22 | May 22 | Jun 22 | Jul 22 | Aug 22 | Sept 22 | Aug 21 | Sept 21 | Apr 22 | May 22 | Jun 22 | Jul 22 | Aug 22 | Sept 22 | Aug 21 | Sept 21 | Apr 22 | May 22 | Jun 22 | Jul 22 | Aug 22 | Sept 22 |
| Avocet | | | 2 | 1 | | | | | | | | | | | | | | | 2 | 1 | | | | |
| Bar-tailed Godwit | 2 | 3 | | | 248 | | 3 | 27 | | | | | | | | 5 | 2 | 3 | | | 248 | | 3 | 27 |
| Black Headed Gull | | | 9 | 15 | 44 | 219 | 449 | 297 | | | 2 | 10 | 2 | 181 | 61 | 216 | | | 9 | 15 | 44 | 219 | 449 | 297 |
| Black-tailed Godwit | 66 | 160 | 581 | 106 | | | 39 | 108 | | 13 | | | | | | 38 | 66 | 160 | 581 | 106 | | | 39 | 108 |
| Common Gull | | | | | 20 | 21 | 1 | 4 | | | | 6 | | 5 | 34 | 18 | | | | 6 | 20 | 21 | 34 | 18 |
| Common Sandpiper | 2 | | | | | 2 | | | 2 | | | | | | | 4 | 2 | | | | | 2 | | 4 |
| Cormorant | | 1 | | | | | | 1 | | 1 | 1 | | | | | | | 1 | 1 | | | | | 1 |
| Curlew† | 14 | 16 | 43 | 16 | 4 | 19 | 20 | 23 | 3 | 3 | 6 | 1 | 3 | 3 | 3 | 4 | 14 | 16 | 43 | 16 | 4 | 19 | 20 | 23 |
| Dunlin | 1 | 222 | 400 | | | | 47 | 131 | 2 | 3 | | | | | | | 2 | 222 | 400 | | | | 47 | 131 |
| Golden Plover | | | 12 | | | | | | | | | | | | | | | | 12 | | | | | |
| Great Black-backed Gull | | | 8 | 4 | | 4 | 2 | 11 | | | | | 1 | | | 4 | | | 8 | 4 | 1 | 4 | 2 | 11 |
| Grey Plover† | | | | | | | | 4 | | | | | | | | | | | | | | | | 4 |
| Herring Gull | | | 13 | 2 | 4 | 7 | 16 | 27 | | | 21 | 6 | 2 | 8 | 1 | 31 | | | 21 | 6 | 4 | 8 | 16 | 31 |
| Knot | | 6 | 4 | 26 | 3 | | | 24 | | | | | | | | | | 6 | 4 | 26 | 3 | | | 24 |
| Lesser Black-backed Gull | | | 6 | 1 | 1 | 14 | 4 | 1 | | | 2 | | | 4 | | | | | 6 | 1 | 1 | 14 | 4 | 1 |
| Little Egret | 2 | 1 | | 1 | | | 1 | 1 | | 1 | | | 1 | | | 1 | 2 | 1 | | 1 | 1 | | 1 | 1 |
| Little Ringed Plover | 3 | | | | | | | | | | | | | | | | 3 | | | | | | | |
| Mallard† | 1 | | | | | | | | | | | | | | | | 1 | | | | | | | |
| Oystercatcher† | | | 5 | 5 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | | | | | 2 | 1 | 5 | 5 | 3 | 3 | 3 | 2 |

| Species | Peak count per passage/summer month (feeding) | | | | | | | | Peak count per passage/summer month (roosting) | | | | | | | | Peak count per passage/summer (combined – non-behavioural) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aug 21 | Sept 21 | Apr 22 | May 22 | Jun 22 | Jul 22 | Aug 22 | Sept 22 | Aug 21 | Sept 21 | Apr 22 | May 22 | Jun 22 | Jul 22 | Aug 22 | Sept 22 | Aug 21 | Sept 21 | Apr 22 | May 22 | Jun 22 | Jul 22 | Aug 22 | Sept 22 |
| Pink-footed Goose | | | | | | | | 1 | | | | | | | | | | | | | | | | 1 |
| Redshank | 6 | 7 | 24 | | | 13 | 9 | 13 | | 2 | 1 | | | | | 1 | 6 | 7 | 24 | | | 13 | 9 | 13 |
| Ringed Plover† | | 1 | | | 2 | | | 10 | | | | | | 2 | | 7 | | 1 | | | 2 | 2 | | 10 |
| Shelduck | 88 | 90 | 12 | 5 | 2 | 8 | 116 | 26 | | 42 | 10 | | | 3 | | 22 | 88 | 90 | 12 | 5 | 2 | 8 | 116 | 26 |
| Teal† | | | | | | | | | | | | | | | | 2 | | | | | | | | 2 |
| Turnstone† | 16 | 41 | 8 | | | | 16 | 31 | 6 | 12 | 5 | | | 5 | | 6 | 16 | 41 | 8 | | | 5 | 16 | 31 |
| Whimbrel | 1 | | 4 | 3 | | 1 | | | | | | | | | | | 1 | | 4 | 3 | | 1 | | |

SPA qualifying species highlighted in bold. † Species with this symbol are included within the SPA waterfowl assemblage.

Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary-wide WeBS 5-year MP.

Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary-wide WeBS 5-year MP.

Cells highlighted blue indicate the count is of national importance. It should be noted that for Black-tailed Godwit the regional importance (> 10% of the WeBS 5-year MP – 565 birds) is higher than the national importance threshold (390 birds). The national importance threshold for Common Sandpiper and Whimbrel is set as 1.

### Intertidal bird abundance and distribution in the vicinity of the Project

1.4.25 In order to better understand the abundance and distribution of waterbirds within and near to the Project, distribution mapping data for the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) has been analysed in more detail. This data was further complimented with discussions with the ornithological surveyors covering the count sector to ensure the information presented is considered representative of this area.

1.4.26 The distribution of waterbirds in this area is shown in **Figure A-7** with the typical range in abundance of the main species recorded from surveys over the last five years (2018/19 to 2022/23) presented in **Table A-8.** The abundance levels of these species have also been compared against the estuary-wide WeBS 5-year mean peak (2017/18 to 2021/22). Other species such as Bar-tailed Godwit occur in numbers of a few individuals (<5 birds) and have not been included in the table.

1.4.27 The data shows flocks of up to 100 Black-tailed Godwit and Dunlin as well as lower numbers (<10-20 birds) of other waders (such Curlew, Dunlin, Knot, Oystercatcher, Redshank) have been recorded feeding in the area during the winter months. With respect to ducks, Teal (<20-30 birds) and Shelduck (<10-20 birds) have been recorded in this area during the winter months (**Figure A-7**). These species are typically recorded on the foreshore but are also occasionally recorded floating on the water near the foreshore (< 50 m). These birds are loafing rather than feeding. These species are rarely recorded further offshore in this area.

1.4.28 As mentioned above, the upper shore boulders and sea defences in Sector C are regularly used through the tide by individuals or small flocks of Turnstone with flocks recorded in the vicinity of the project (typically < 20 to 30 birds feeding and roosting year-round). The sea defences and upper shore in this area are typically only used infrequently as a roost by other waders and wildfowl (<10 birds of each species).

1.4.29 When compared to estuary-wide numbers, wintering Black-tailed Godwit and Turnstone (both feeding and roosting) occurred in locally important numbers with counts representing up to 2% and 10% respectively of the estuary-wide WeBS 5-year mean peak (2017/18 to 2021/22). Counts of other species represent < 1 of the estuary-wide WeBS 5-year mean peak.

1.4.30 Data for surveys during the passage and summer periods (August to September 2021 and April to September 2022) recorded lower numbers of waterbirds in this area compared to the winter. With respect to Black-tailed Godwit <10 feeding birds were recorded during some of the autumn surveys with no birds recorded during surveys from April to July 2022. Other waders and Shelduck were also typically present in low numbers feeding (<10 birds) with the exception of Turnstone (discussed above). During passage periods all counts represented < 1 of the estuary-wide WeBS 5-year mean peak.

**Table A-8: Counts recorded as part of the IOH Ornithology Surveys in Sector C between the IOT Jetty and the mudflat fronting North Beck drain as a proportion of the current estuary-wide WeBS 5-year mean peak**

| Species | Winter months (October to March from 2018/19 to 2022/23) | | | Passage months (August to September 2021 and April to September 2022) | | |
|---|---|---|---|---|---|---|
| | Abundance in area (feeding)* | Abundance in area (roosting)* | Counts recorded as a % of the current estuary-wide WeBS 5-year mean peak | Abundance in area (feeding)* | Abundance in area (roosting)* | Counts recorded as a % of the current estuary-wide WeBS 5-year mean peak |
| Black-tailed Godwit | <100 birds | <10 birds | Up to 2% (feeding) and <1% roosting | <5-10 birds | No birds recorded | < 1% |
| Curlew† | <10-20 birds | <10 birds | < 1% | <5-10 birds | 1-2 | < 1% |
| Dunlin | <100 birds | <10 birds | < 1% | <5-10 birds | No birds recorded | < 1% |
| Knot | <10-20 birds | <10 birds | < 1% | <5-10 birds | No birds recorded | < 1% |
| Oystercatcher† | <10-20 birds | <10 birds | < 1% | <5-10 birds | No birds recorded | < 1% |
| Redshank | <10-20 birds | <10 birds | < 1% | <5-10 birds | No birds recorded | < 1% |
| Shelduck | <10-20 birds | <10 birds | < 1% | <5-10 birds | No birds recorded | < 1% |
| Teal† | <20-30 birds | <10 birds | < 1% | <5-10 birds | No birds recorded | < 1% |
| Turnstone† | <20-30 birds | <20-30 birds | Up to 10% (feeding/roosting | <20-30 birds | 1-2 | Up to 10% (feeding/roosting |
| *All other species have been recorded as single individuals or very small flocks (<5 birds). | | | | | | |

### Terrestrial Habitats (Passage and Wintering SPA/Ramsar Waterbirds)

1.4.31 Habitats within the majority of the land impacted by the pipeline route are unsuitable for coastal waterbirds, as they comprise scrub/woodland that are not suitable for high tide roosting/loafing/feeding waterbirds, and areas of land currently used for port-related storage/ operational areas.

1.4.32 The habitat within the West Site is dominated by tall-swarded grassland having been abandoned from agricultural cultivation approximately ten years ago. Consequently, the habitats within the West Site are not suitable for high tide roosting/loafing/feeding waterbirds from the nearby Humber Estuary SPA/Ramsar. This is because there is insufficient scanning distance for birds to observe approaching ground-based predators, and they therefore typically avoid taller swarded grassland. This conclusion is supported by the findings of a limited suite of wintering bird surveys undertaken to coincide with the high tide period in February and March 2022, which did not record any SPA/Ramsar waterbird species (**ANNEX A.1**). Previous wintering bird surveys of these fields undertaken for a 2013 Drax planning application (planning reference: DM/1027/113/OUT) also did not record any SPA/Ramsar waterbirds, and the habitats were concluded to be unsuitable for waterbirds. Further survey of these habitats for wintering/ passage SPA/Ramsar waterbirds was therefore scoped out and it is reasonable to conclude that the land is not functionally linked to the Humber Estuary SPA/ Ramsar.

1.4.33 The large arable field adjacent to the Humber Estuary within the Temporary Compound Area off Laporte Road was identified within the PEA (**Appendix 8.B of the ES [TR030008/APP/6.4]**) as being potentially suitable for coastal waterbirds, given its proximity to intertidal feeding habitats. Surveys were undertaken across the passage and wintering period of 2022/2023[7] and the surveys did not record any locally important aggregations of SPA/Ramsar waterbirds (i.e. at numbers >1% of the WeBS 5 year mean peak count). Records of SPA/ Ramsar waterbirds were limited to occasional observations of single or low numbers (<5) of curlew on three occasions. These numbers are well below 1% of the Humber Estuary WeBS 5 year mean peak count for this species of curlew, which is 25 birds. It is therefore concluded that the land is not functionally linked to the Humber Estuary SPA/ Ramsar. The survey results are presented in **ANNEX A.1**.

### Terrestrial Habitats (Breeding SPA/ Ramsar Species)

1.4.34 There is no suitable terrestrial habitat (i.e. above Mean High Water) within the Site for breeding SPA/Ramsar species Bittern, Marsh Harrier or Avocet. Marsh Harrier has been previously recorded overflying West Site in 2013 (information contained within an ecology report submitted with planning application DM/1027/13/ OUT) but there are no extensive areas of reedbed/marsh habitat that would be suitable nesting habitat within the West Site; the reedbed habitat within the West Site is restricted to narrow bands within/on the margins of the ditches. Similarly there are no areas of reedbed/ marsh habitat within the

7 Terrestrial surveys were undertaken twice monthly across the High Water period between September 2022 and March 2023 inclusive.

terrestrial areas of the Site boundary suitable for breeding Bittern, and no pools suitable for breeding Avocet (the nearest known breeding habitat for Avocet is the open water/ islands at Rosper Road Pools Local Wildlife Site, which is approximately 5km north of the Site). Breeding SPA/Ramsar species are therefore not considered further and are scoped out of the assessment.

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**Figure A-1: Internationally designated conservation sites**

**Figure A-2: Project subtidal benthic sampling stations**

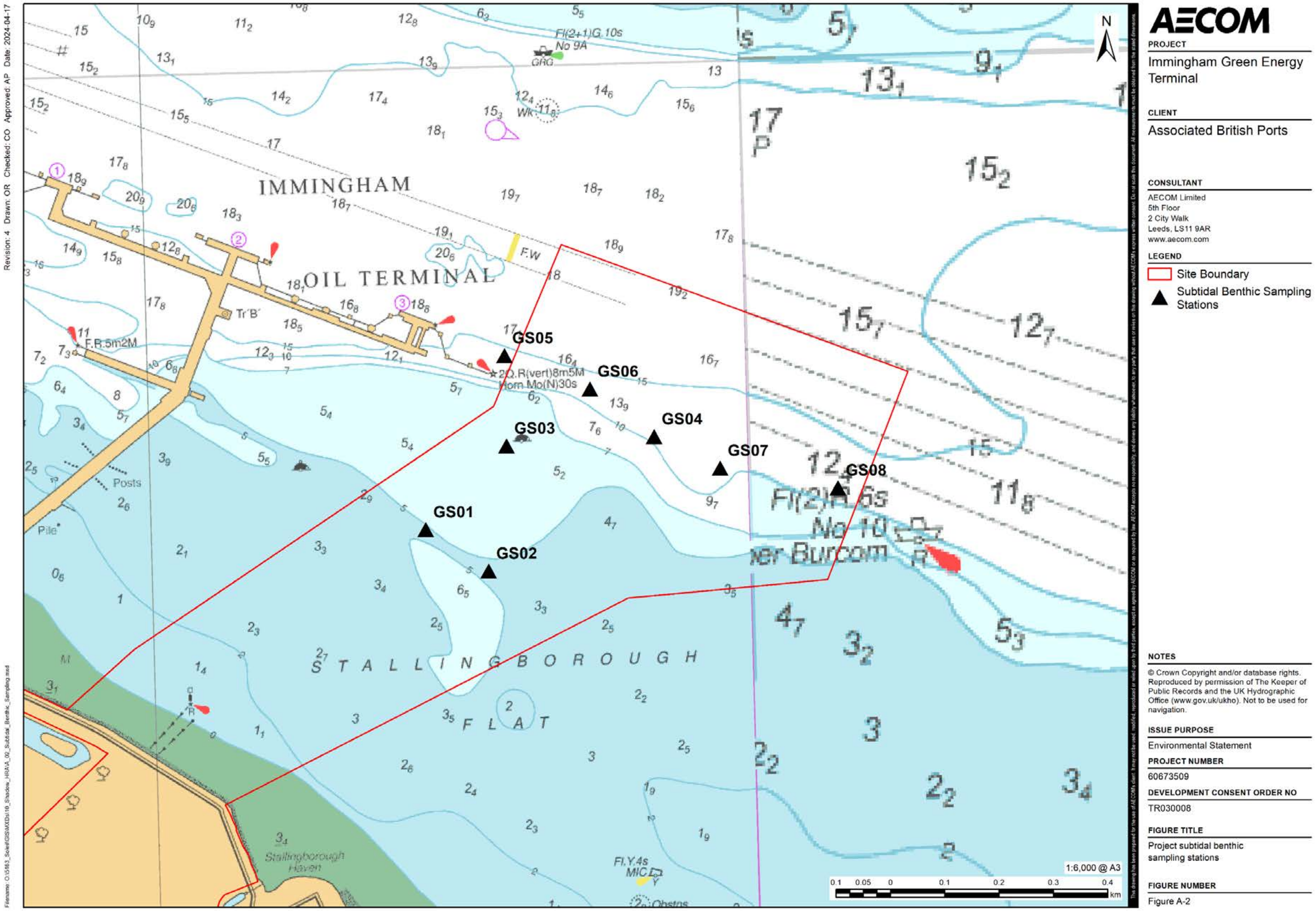

**Figure A-3: Annual grey seal pup counts at Donna Nook**

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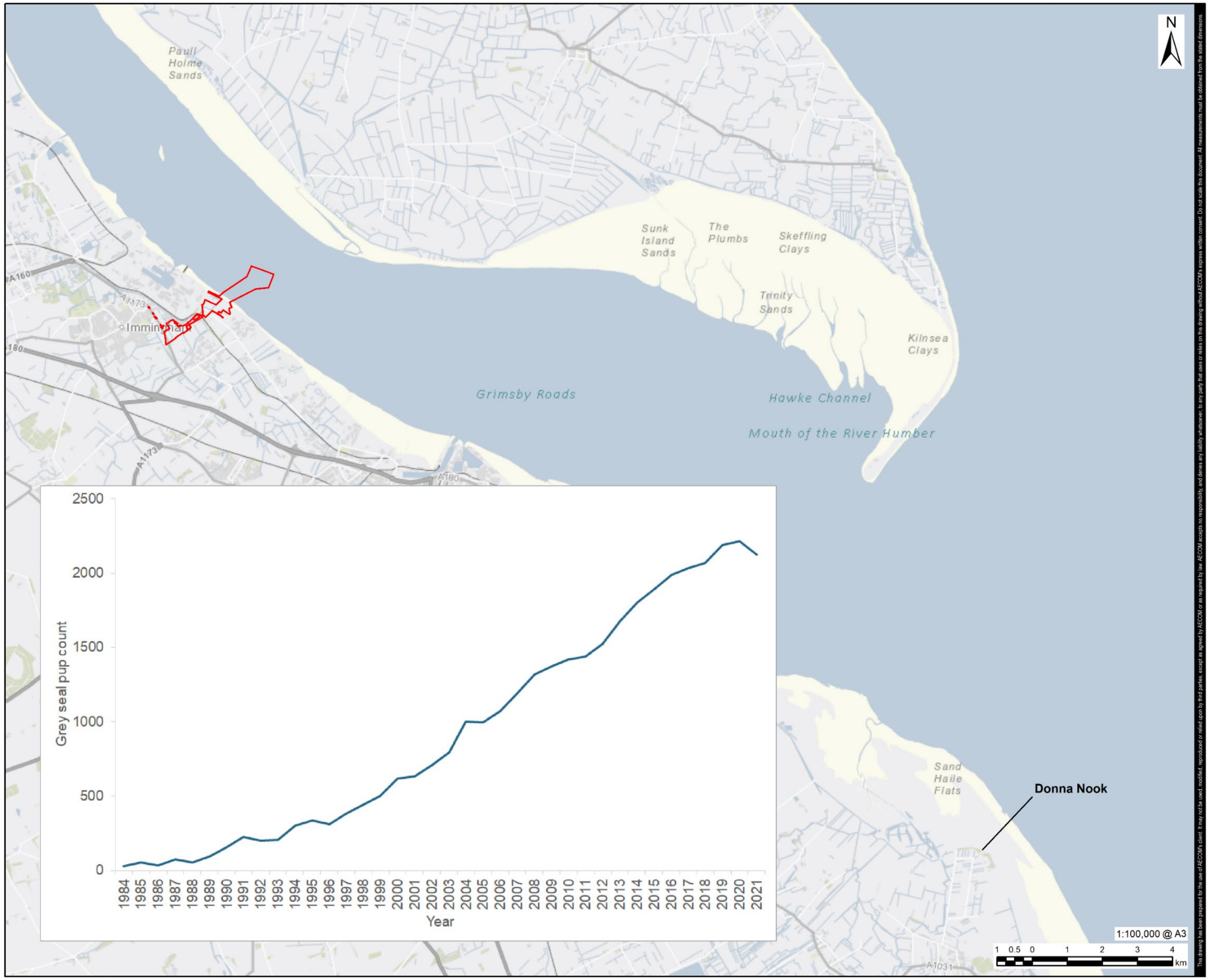


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FIGURE TITLE
Annual grey seal pup counts at Donna Nook

FIGURE NUMBER
Figure A-3

**Figure A-4: Aerial counts of grey seals at Donna Nook**

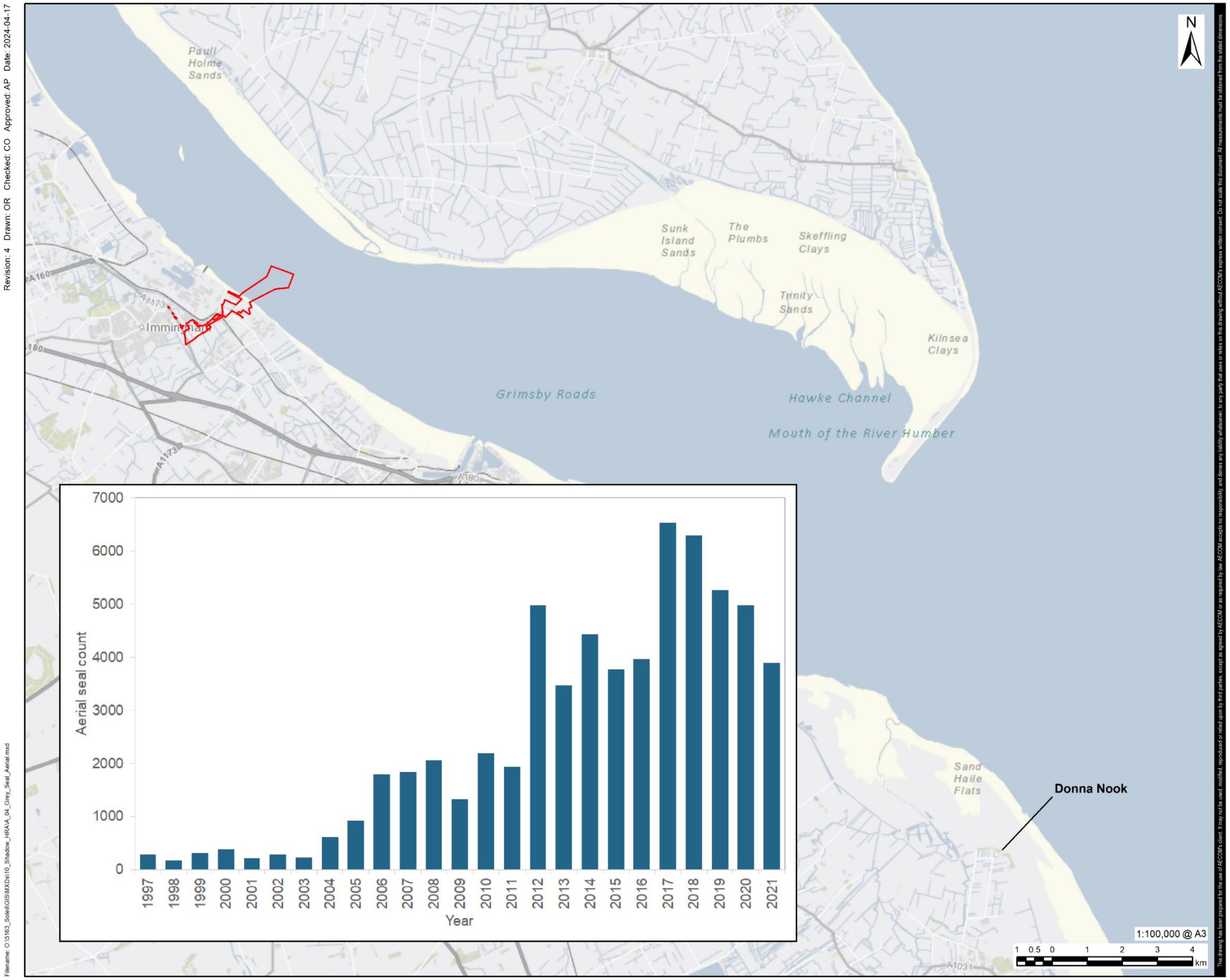


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FIGURE TITLE
Aerial counts of grey seals at Donna Nook

FIGURE NUMBER
Figure A-4

**Figure A-5: Locations of coastal waterbird surveys**

**Figure A-6: The 5-year mean peak number of birds in Sector C during different months**

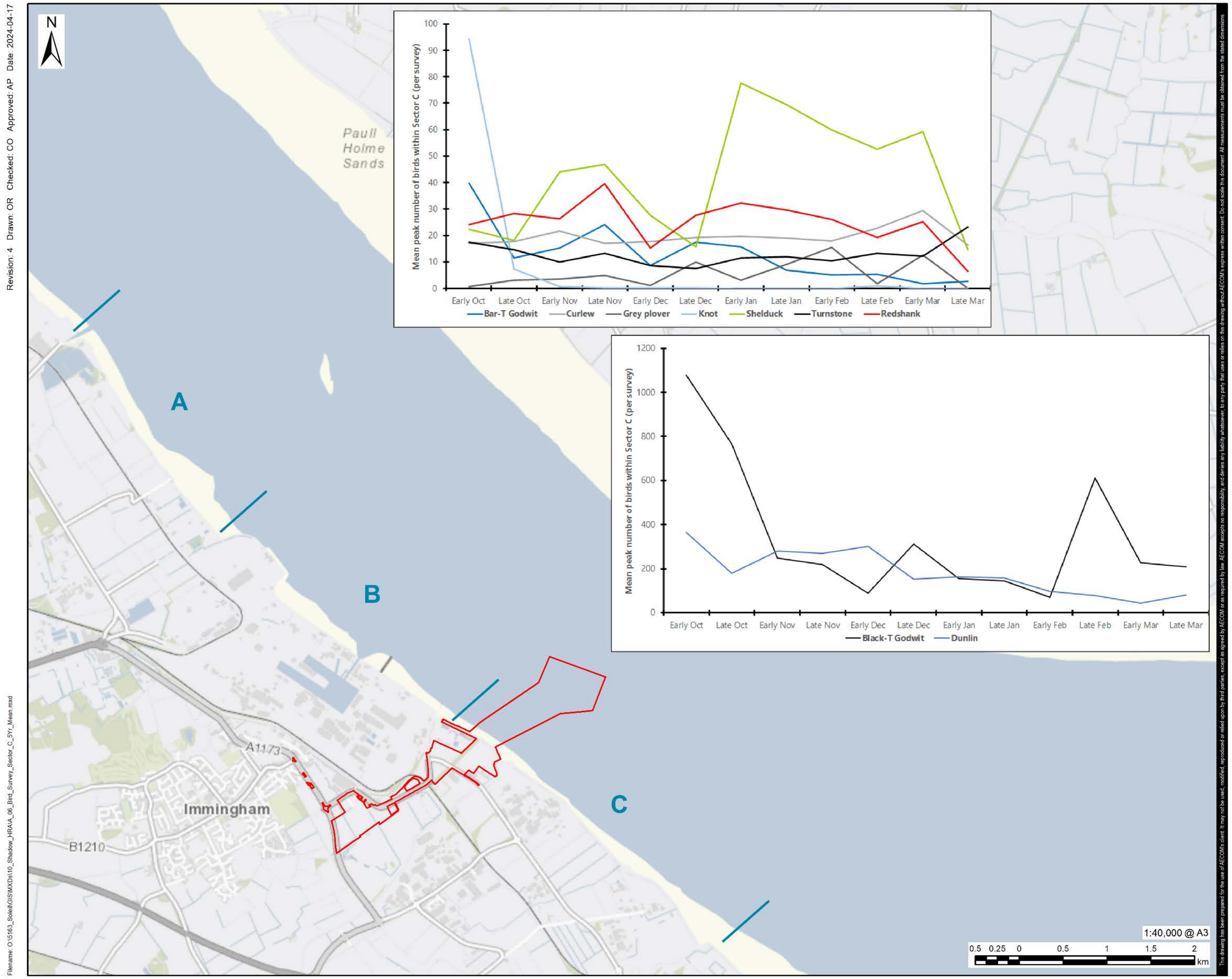


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FIGURE TITLE
The 5-year mean peak number of birds in Sector C during different months

FIGURE NUMBER
Figure A-6

**Figure A-7: The broad distribution of coastal waterbirds in Sector C**

# ANNEX A.1 Baseline Ornithology Data

# Immingham Green Energy Terminal

TR030008

Volume 7

Annex A.1: Baseline Ornithology Data

# Table of contents

Chapter Pages



Tables

# 1. Introduction

## 1.1. Baseline Ornithology Data - Intertidal

1.1.1 Pre and post consent monitoring of coastal waterbird surveys as part of the Immingham Outer Harbour development have been undertaken annually since winter 1997/98.

1.1.2 The foreshore in the area of the Project overlaps with 'Sector C' (between the Immingham Oil Terminal Jetty and Oldfleet Drain (as shown in **Figure 10.1 [TR030008/APP/6.3]).** Error! Reference source not found. presents monthly peak counts for the period October 2021 to September 2022. During this period, surveys were undertaken between October and March twice a month. During each survey, either five counts (October and March) or four counts (November to February) were undertaken every two hours after high water.

## Table 1- Monthly peak counts of coastal waterbirds for the period October 2021 to September 2022

| Species | Peak count (feeding) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | MP |
| **Avocet** | | | | | | | 2 | 1 | | | | | 0.3 |
| **Bar-T Godwit** | 141 | 14 | 26 | 21 | 23 | 8 | | | 248 | | 3 | 27 | 43 |
| Black Headed Gull | | | | | | 83 | 9 | 15 | 44 | 219 | 449 | 297 | 93 |
| **Black-T Godwit** | 2591 | 720 | 250 | 511 | 940 | 416 | 581 | 106 | | | 39 | 108 | 522 |
| Canada Goose | | | | | | | | 4 | | | | | 0.3 |
| Common Gull | | | | | | 1 | | | 20 | 21 | 1 | 4 | 4 |
| Common Sandpiper | | | | | | | 4 | 3 | | 1 | | | 1 |
| Cormorant | | | | | | | | | | | | 1 | 0.1 |
| Curlew | 33 | 37 | 21 | 29 | 25 | 33 | 43 | 16 | 4 | 19 | 20 | 23 | 25 |
| **Dunlin** | 152 | 462 | 126 | 556 | 254 | 61 | 400 | | | | 47 | 131 | 182 |
| **Golden Plover** | | 1 | | | 13 | | | | | | | | 1 |
| Goldeneye† | | 1 | | | | | | | | | | | 0.1 |
| Great Black-backed Gull | | | | | | 1 | 8 | 4 | | 4 | 2 | 11 | 3 |
| **Grey Plover**† | 1 | 4 | 41 | 24 | 75 | 60 | 12 | | | | | 4 | 18 |
| Greylag Goose | | | | | | 2 | | | | | | | 0.2 |
| Herring Gull | | | | | | 13 | 13 | 2 | 4 | 7 | 16 | 27 | 7 |
| **Knot** | 39 | | | | | | 4 | 26 | 3 | | | 24 | 8 |
| Lesser Black-backed Gull | | | | | | 2 | 6 | 1 | 1 | 14 | 4 | 1 | 2 |
| Little Egret | | | | | | | | 1 | | | 1 | 1 | 0.3 |
| Little Ringed Plover | | | | | | | | | | | | | |
| Mute swan | | | | | | | | | | | | | |
| Oystercatcher† | | 1 | | 2 | 3 | 7 | 5 | 5 | 3 | 3 | 3 | 2 | 3 |
| Pink-footed Goose | | | | | | | | | | 2 | | 1 | 0.3 |
| **Redshank** | 11 | 80 | 31 | 42 | 22 | 23 | 24 | | | 13 | 9 | 13 | 22 |
| Ringed Plover† | | | | 2 | | | | | 2 | | | 10 | 1 |
| **Shelduck** | 45 | 128 | 22 | 55 | 78 | 43 | 12 | 5 | 2 | 8 | 116 | 26 | 45 |
| Teal† | | | | | | 3 | | | | | | | 0.3 |
| Turnstone† | 32 | 14 | 14 | 23 | 12 | 35 | 8 | | | | 16 | 31 | 15 |
| Yellow-legged Gull | | | | | | 1 | | | | | | | 0.1 |

| Species | Peak count(roosting) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | MP |
| **Avocet** | | | | | | | | | | | | | |
| **Bar-T Godwit** | | | | | | | | | | | | 5 | 0.4 |
| Black Headed Gull | 46 | 30 | 71 | 238 | 0 | 213 | 0 | 0 | 0 | 0 | 0 | 38 | 53 |
| **Black-T Godwit** | | | | | | | | | | | | | |
| Canada Goose | | | | | | | | | | | | | |
| Common Gull | | | | | | | | | | | | | |
| Common Sandpiper | | | | | | | | | | | | | |
| Cormorant | | | | | | | 1 | | | | | | 0.1 |
| Curlew | 3 | 1 | 2 | 16 | 5 | 12 | 6 | 1 | 3 | 3 | 3 | 4 | 5 |
| **Dunlin** | 4 | | 2 | 1 | 1 | 3 | | | | | | | 1 |
| **Golden Plover** | | | | | | | | | | | | | |
| Goldeneye† | | | | | | | | | | | | | |
| Great Black-backed Gull | | | | | | | | | | | | | |
| **Grey Plover**† | | | | | | | | | | | | | |
| Greylag Goose | | | | | | | | | | | | | |
| Herring Gull | | | | | | | | | | | | | |
| **Knot** | | | | | | | | | | | | | |
| Lesser Black-backed Gull | | | | | | | | | | | | | |
| Little Egret | | | | | | | | | | 1 | | 1 | 0.2 |
| Little Ringed Plover | | | | | | | | | | | | | |
| Mute swan | | | | | | 1 | | | | | | | 0.1 |
| Oystercatcher† | | | | | 1 | 2 | 2 | 2 | | | | | 1 |
| Pink-footed Goose | | | | | | | | | | | | | |
| **Redshank** | 2 | | 15 | 44 | 1 | 10 | 1 | | | | | 1 | 6 |
| Ringed Plover† | 7 | 12 | 7 | 10 | 16 | 10 | | | | | 2 | 7 | 6 |
| **Shelduck** | | 3 | 4 | 0 | 1 | 18 | 10 | | | | 3 | 22 | 5 |
| Teal† | | | | | | | | | | | | 2 | 0.2 |
| Turnstone† | 3 | 7 | | 17 | 6 | 23 | 5 | | | | 5 | 6 | 6 |
| Yellow-legged Gull | | | | | | | | | | | | | |

| Species | Peak count (combined – non-behavioural) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | MP |
| **Avocet** | | | | | | | 2 | 1 | | | | | 0.3 |
| **Bar-T Godwit** | 141 | 14 | 26 | 21 | 23 | 8 | | | 248 | | 3 | 27 | 43 |
| Black Headed Gull | | | | | | 83 | 9 | 15 | 61 | 219 | 449 | 297 | 94 |
| **Black-T Godwit** | 2591 | 720 | 250 | 511 | 940 | 416 | 581 | 106 | | | 39 | 108 | 522 |
| Canada Goose | | | | | | | | 4 | | | | | 0.3 |
| Common Gull | | | | | | 5 | | 6 | 34 | 21 | 5 | 18 | 7 |
| Common Sandpiper | | | | | | | 4 | 3 | | 1 | | 4 | 1 |
| Cormorant | | | | | | | 1 | | | | | 1 | 0.2 |
| Curlew | 33 | 37 | 21 | 29 | 25 | 33 | 43 | 16 | 4 | 19 | 20 | 23 | 25 |
| **Dunlin** | 152 | 462 | 126 | 556 | 254 | 61 | 400 | | | | 47 | 131 | 182 |
| **Golden Plover** | | 1 | | | 13 | | | | | | | | 1 |
| Goldeneye† | | 1 | | | | | | | | | | | 0.1 |
| Great Black-backed Gull | | | | | | 2 | 8 | 4 | | 4 | 2 | 11 | 3 |
| **Grey Plover**† | 1 | 4 | 41 | 24 | 75 | 60 | 12 | | | | | 4 | 18 |
| Greylag Goose | | | | | | 2 | | | | | | | 0.2 |
| Herring Gull | | | | | | 13 | 21 | 6 | 4 | 7 | 16 | 31 | 8 |
| **Knot** | 39 | | | | | | 4 | 26 | 3 | | | 24 | 8 |
| Lesser Black-backed Gull | | | | | | 4 | 6 | 1 | 1 | 14 | 4 | 1 | 3 |
| Little Egret | | | | | | | | 1 | | 1 | 1 | 1 | 0.3 |
| Little Ringed Plover | | | | | | 1 | | | | | | | 0.1 |
| Mute swan | | | | | | 1 | | | | | | | 0.1 |
| Oystercatcher† | | 1 | | 2 | 3 | 7 | 5 | 5 | 3 | 3 | 3 | 2 | 3 |
| Pink-footed Goose | | | | | | | | | | 2 | | 1 | 0.3 |
| **Redshank** | 11 | 80 | 31 | 44 | 22 | 23 | 24 | | | 13 | 9 | 13 | 23 |
| Ringed Plover† | 7 | 12 | 7 | 10 | 16 | 10 | | | 2 | | 2 | 10 | 6 |
| **Shelduck** | 45 | 128 | 22 | 55 | 78 | 43 | 12 | 5 | 2 | 8 | 116 | 26 | 45 |
| Teal† | | | | | | 3 | | | | | | 2 | 0.4 |
| Turnstone† | 32 | 14 | 14 | 23 | 12 | 35 | 8 | | | | 16 | 31 | 15 |
| Yellow-legged Gull | | | | | | 1 | | | | | | | 0.1 |

SPA qualifying species highlighted in **bold.** † Species with this symbol are included within the SPA waterfowl assemblage.

| | |
|---|---|
| (green) | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year MP. |
| (orange) | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year MP. |
| (blue) | Cells highlighted blue indicate the count is of national importance. It should be noted that for Black-tailed Godwit the regional importance (> 10% of the estuary wide WeBS 5-year MP – 565 birds) is higher than the national importance threshold (390 birds). The national importance threshold for Common Sandpiper and Whimbrel is set as 1. |
| (red) | Cells highlighted red indicate the count is of international importance. |

## 1.2. Baseline Ornithology Data – Terrestrial Overwintering SPA/ Ramsar Species

**Scoping**

1.2.1 Following the completion of a Preliminary Ecological Appraisal ("PEA") **[TR030008/APP/6.4]** of terrestrial habitats within the Project boundary, the following areas were subject to terrestrial wintering bird surveys as they were identified as having habitats that could support SPA/ Ramsar waterbirds across the high tide period and thus may be functionally linked to the Humber Estuary SPA/Ramsar:

a. West Site – this is formerly arable land (comprising three fields separated by ditches) that was taken out of agricultural cultivation around 10 years ago, and has consequently developed through natural succession into an area of rank neutral grassland, with some areas of establishing scrub in the south (which is self seeded from the adjacent hedgerow).

b. Temporary Compound Area – this is a large (c. 11 ha) arable field fronting the Humber Estuary off Laporte Road, which was under a winter wheat crop in winter 2022/23.

1.2.2 No other areas of terrestrial habitat within the Project boundary were identified as being suitable to support overwintering SPA/Ramsar waterbirds, and were therefore scoped out of further survey effort for wintering birds.

**Method**

1.2.3 Surveys of wintering birds using the West Site and Temporary Compound Area were undertaken to assess whether land is functionally linked to the Humber Estuary SPA/Ramsar site (and thus afforded additional protection in the planning process). The survey was based on methods following Bibby et al (2000) (Ref 1-1) and Gilbert et al, (1998) (Ref 1-2), with all areas within the West Site and the Temporary Compound Area surveyed.

1.2.4 The surveys were undertaken twice per month for a period of two hours either side of high tide, with surveys alternating between early in the morning, commencing just after sunrise and late afternoon, finishing before dusk. This approach helped to establish the overall use of the Site by different species groups, particularly any species which may arrive at or after dusk to roost overnight. Surveys of the West Site were undertaken twice per month in February and March 2022, and of the Temporary Compound Area twice per month between September and March (inclusive) over two wintering seasons in 2021/22 and 2022/23.On each survey visit the route was walked at a slow pace with start and finish times noted. All birds seen and heard were recorded directly onto a base map of the Site. Registrations of birds were recorded using standard British Trust for Ornithology ("BTO") two letter species codes. All bird species were recorded and mapped across the Site. Each survey visit was undertaken to coincide with high tide at the adjacent Immingham Docks during appropriate weather conditions (dry with a wind speed <F5) for recording birds survey. The times and dates of the surveys and the weather conditions are set out in the table below.

1.2.5 No anthropogenic sources of disturbance (e.g. walkers, horse riders), or any other sources of disturbance (e.g. peregrine) that could have displaced birds were observed during the surveys.

**Table 2: Dates and Weather Conditions for Terrestrial Wintering Bird Surveys (West Site)**

| Visit Number | Date | High Tide Time | Sunrise/Sunset | Survey Times | Weather Conditions |
|---|---|---|---|---|---|
| 1 | 04/02/2022 | 08:14 | 07:40 | 07:14 – 09:14 | F3SW, 4°C, dry, good visibility, cloud cover 7/8. |
| 2 | 28/02/2022 | 16:14 | 17:40 | 12:35 – 16:35 | F3S, 10°C, dry (then rain from 15:00), cloud cover 8/8. |
| 3 | 17/03/2022 | 17:33 | 18:08 | 12:30 – 14:30 | F4SW, 13°C, dry, good visibility, cloud cover 2/8. |
| 4 | 21/03/2022 | 07:53 | 06:01 | 06:50 – 08:50 | F1SE, 4 to 11°C, dry, good visibility, cloud cover 2/8. |

**Table 3: Dates and Weather Conditions for Terrestrial Wintering Bird Surveys (Temporary Compound Area)**

| Visit Number | Date | High Tide Time | Sunrise/Sunset | Survey Times | Weather Conditions |
|---|---|---|---|---|---|
| **Winter 2021/22** | | | | | |
| 1 | 01/09/2021 | 13:52 5.36m | 06:09 | 11:50-15:55 | wind NE F5, Cloud 6/8, Temp 15, Visabilty >2km, Dry |
| 2 | 16/09/2021 | 14:56 5.73m | 19:13 | 12:56-16:57 | wind SW F3, Cloud 4/8, Temp 12, Visabilty >2km, Dry |
| 3 | 11/10/2021 | 09:36 7.05m | 07:20 | 07:35-11:36 | wind W F2, Cloud 2/8, Temp 11, Visabilty >2km, Dry |
| 4 | 30/10/2021 | 14:07 5.43m | 17:31 | 12:07-16:07 | wind SE F3, Cloud 8/8, Temp 10, Visabilty >2km, Dry |
| 5 | 11/11/2021 | 10:43 6.01m | 07:19 | 08:43-12:43 | wind S F3, Cloud 3/8, Temp 10, Visabilty >2km, Dry |

| Visit Number | Date | High Tide Time | Sunrise/Sunset | Survey Times | Weather Conditions |
|---|---|---|---|---|---|
| 6 | 29/11/2021 | 13:22 5.77m | 15:46 | 11:21-15:23 | wind SW F4, Cloud 6/8, Temp 10, Visabilty >2km, Dry |
| 7 | 10/12/2021 | 10:31 6.16m | 08:06 | 08:31-12:31 | wind SE F2, Cloud 4/8, Temp 6, Visabilty >2km, Dry |
| 8 | 28/12/2021 | 12:26 5.80m | 15:47 | 10:25-14:27 | wind SE F3, Cloud 6/8, Temp 8, Visabilty >2km, Dry |
| 9 | 08/01/2022 | 10:01 6.30m | 08:14 | 08:01-12:01 | wind S F4, Cloud 8/8, Temp 6, Visabilty >2km, Dry |
| 10 | 27/01/2022 | 12:47 5.75m | 16:33 | 10:47-14:47 | wind SSW F5, Cloud 6/8, Temp 6, Visabilty >2km, Dry |
| 11 | 07/02/2022 | 09:54 6.10m | 07:35 | 07:54-11:54 | wind SW F3, Cloud 4/8, Temp 4, Visabilty >2km, Dry |
| 12 | 22/02/2022 | 09:14 6.43m | 07:04 | 07:14-11:14 | wind S F2, Cloud 8/8, Temp 6, Visabilty >2km, Dry |
| 13 | 12/03/2022 | 13:03 5.13m | 17:59 | 11:02-15:04 | wind SE F5, Cloud 6/8, Temp 12, Visabilty >2km, Dry |
| 14 | 29/03/2022 | 16:50 6.35m | 19:30 | 14:50-18:50 | wind NE F4, Cloud 6/8, Temp 12, Visabilty >2km, Dry |
| **Winter 2022/23** | | | | | |
| 1 | 01/09/2022 | 09:21 6.94m | 06:09 | 11:50-15:55 | wind NNE F5, Cloud 8/8, Temp 12, Visabilty >2km, Dry |
| 2 | 17/09/2022 | 10:49 6.15m | 06:37 | 08:49-12:49 | wind N F2, Cloud 5/8, Temp 10, Visabilty >2km, Dry |
| 3 | 15/10/2022 | 09:37 6.48m | 07:27 | 07:37-11:37 | wind NW F3, Cloud 5/8, Temp 8, Visabilty >2km, Dry |
| 4 | 31/10/2022 | 09:31 6.27m | 06:58 | 07:30-11:32 | wind SW F2, Cloud 8/8, Temp 8, Visabilty >2km, Dry |

| Visit Number | Date | High Tide Time | Sunrise/Sunset | Survey Times | Weather Conditions |
|---|---|---|---|---|---|
| 5 | 05/11/2022 | 15:56 6.60m | 16:20 | 13:56-17:57 | wind S F4, Cloud 8/8, Temp 10, Visabilty >2km, Dry |
| 6 | 29/11/2022 | 09:36 6.35m | 07:51 | 07:35-11:37 | wind SW F6, Cloud 8/8, Temp 6, Visabilty >2km, Dry |
| 7 | 03/12/2022 | 14:25 6.13m | 15:43 | 12:25-16:25 | wind NE F2, Cloud 6/8, Temp 4, Visabilty >2km, Dry |
| 8 | 30/12/2022 | 11:31 6.06m | 15:48 | 09:30-13:32 | wind NW F6, Cloud 6/8, Temp 8, Visabilty >2km, Dry |
| 9 | 14/01/2023 | 10:14 5.88m | 08:10 | 08:15-12:15 | wind SSE F3, Cloud 6/8, Temp 4, Visabilty >2km, Dry |
| 10 | 30/01/2023 | 12:36 5.53m | 07:50 | 10:35-14:37 | wind SW F5, Cloud 8/8, Temp 6, Visabilty >2km, Dry |
| 11 | 11/02/2023 | 08:56 6.31m | 07:28 | 06:56-10:57 | wind SSW F2, Cloud 4/8, Temp 4, Visabilty >2km, Dry |
| 12 | 18/02/2023 | 16:16 6.45m | 17:16 | 14:15-18:15 | wind S F2, Cloud 8/8, Temp 8, Visabilty >2km, Dry |
| 13 | 14/03/2023 | 09:50 6.17m | 06:21 | 07:49-11:51 | wind NW F1, Cloud 4/8, Temp 7, Visabilty >2km, Dry |
| 14 | 29/03/2023 | 11:25 5.46m | 06:42 | 09:25-13:25 | wind SSE F4-5, Cloud 4/8, Temp 8, Visability >2km, Dry |

**Results**

*West Site*

1.2.6 The purpose of the surveys undertaken in this part of the Survey Area was to determine whether the land could be potentially functionally linked to the Humber Estuary SPA/Ramsar, and thus merit further wintering bird surveys to cover a full passage/wintering season. However, no SPA/Ramsar waterbirds were recorded within the West Site during the surveys. The grassland habitats within the West Site boundary are too overgrown to support high tide roosting waterbirds, and this was supported by the findings of the limited wintering bird surveys undertaken as detailed below.

1.2.7 During the four winter bird survey visits conducted at the Main Site between 17 February and 21 March 2022, a total of 22 bird species were recorded at the Site. This included five SPIs, five Red List and seven Amber List BoCC five species. These are listed in **Table 4**.

### Table 4: Results of Wintering Bird Survey (Terrestrial) in West Site - 2022

| English Name | Scientific Name | Birds of Conservation Concern 5 (BOCC5) | Annex 1 of the EU Birds Directive (Annex 1) | Schedule 1 Wildlife and Countryside Act 1981 (Schedule 1) | UK Biodiversity Action Plan Priority Species (UK BAP) | NERC Act 2006 | Visit 1 04/02/2022 | Visit 2 28/02/2022 | Visit 3 17/03/2022 | Visit 4 21/03/2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| Blackbird | *Turdus merula* | | | | | | 7 | 5 | 3 | 1 |
| Blue Tit | *Cyanistes caeruleus* | | | | | | | | 1 | |
| Carrion crow | *Corvus corone* | | | | | | 3 | 2 | | |
| Dunnock | *Prunella modularis* | Amber | | | ✓ | s.41 species | 1 | | 2 | 2 |
| Goldfinch | *Carduelis carduelis* | | | | | | 2 | 2 | 2 | 2 |
| Great Tit | *Parus major* | | | | | | 1 | 1 | 1 | 2 |
| Linnet | *Linaria cannabina* | Red | | | ✓ | s.41 species | | | 1 | 2 |
| Long-tailed Tit | *Aegithalos caudatus* | | | | | | 6 | 1 | 2 | 2 |
| Magpie | *Pica pica* | | | | | | 3 | 4 | 3 | 2 |
| Meadow Pipit | *Anthus pratensis* | Amber | | | | | 4 | 2 | 2 | 4 |
| Pheasant | *Phasianus colchicus* | | | | | | 1 | 1 | 1 | 1 |
| Redwing | *Turdus iliacus* | Amber | | | | | 2 | 10 | | 1 |
| Reed Bunting | *Emberiza schoeniclus* | Amber | | | ✓ | s.41 species | 4 | 1 | | 4 |
| Robin | *Erithacus rubecula* | | | | | | 2 | 3 | 1 | 1 |
| Skylark | *Alauda arvensis* | Red | | | ✓ | s.41 species | 1 | 1 | 2 | 1 |
| Snipe | *Gallinago gallinago* | Amber | | | | | 1 | 5 | | 1 |
| Starling | *Sturnus vulgaris* | Red | | | ✓ | s.41 species | 7 | | | |
| Woodpigeon | *Columba palumbus* | Amber | | | | | 7 | 3 | 6 | 28 |
| Woodcock | *Scolopax rusticola* | Red | | | | | 4 | | | 1 |
| Wren | *Troglodytes troglodytes* | Amber | | | | | 4 | 2 | 4 | 4 |
| Yellowhammer | *Emberiza citrinella* | Red | | | ✓ | s.41 species | | 1 | | 1 |
| Total number of species recorded per visit | | | | | | | 18 | 16 | 15 | 18 |

*Temporary Compound Area*

1.2.8 The purpose of the surveys undertaken in this part of the Survey Area was to determine whether the land was functionally linked to the Humber Estuary SPA/ Ramsar. The arable land was identified as potentially suitable for SPA/Ramsar waterbirds due to it being estuary-fronting, and consequently in close proximity to mudflats that support wintering waterbirds, which are known to use terrestrial fields in and around the estuary across the high tide period for feeding, roosting and loafing.

1.2.9 The surveys only recorded one SPA/Ramsar species (curlew) in very low numbers, typically as single or small groups of individuals and flocks.

1.2.10 The survey results indicate that this field does not support aggregations of SPA/ Ramsar waterbirds in locally important numbers, i.e. does not support >1% of the Humber Estuary five-year peak mean for any species,and is therefore not functionally linked to the Humber Estuary SPA/Ramsar.

**Table 5: Results of Wintering Bird Survey (Terrestrial) in Temporary Compound Area - 2023**

| Visit | Species English Name | Species Latin Name | Count Cycle Before HT | | Count Cycle After HT | |
|---|---|---|---|---|---|---|
| | | | Number | Activity | Number | Activity |
| 11.10.21 | Curlew | Numnius arquata | 2 | Roosting | 2 | Roosting |
| 10.12.21 | Curlew | Numnius arquata | 4 | Feeding & roosting | 4 | Roosting |
| 08.01.21 | Curlew | Numnius arquata | 1 | Roosting | 1 | Roosting |

## 1.3. Baseline Ornithology Data – Terrestrial Breeding non-SPA/ Ramsar Species

**Survey Area**

1.3.1 Following the completion of a PEA **[TR030008/APP/6.4]** of terrestrial habitats within the Project boundary, the following areas were subject to breeding bird surveys as they were identified as having habitats that could support assemblages of breeding birds:

a. West Site – this is formerly arable land (comprising three fields separated by ditches) that was taken out of agricultural cultivation around 10 years ago, and has consequently developed through natural succession into an area of rank neutral grassland, with some areas of establishing scrub in the south (which is self seeded from the adjacent hedgerow).

b. East Site – Ammonia Storage site – this is also formerly arable land that was taken out of agricultural cultivation around 10 years ago; the marginal areas have become invaded with dense areas of bramble scrub and self-seeded silver birch. The central portion has been previously cleared and crushed aggregate installed to create storage for port-related activities; this area is consequently open and free of scrub, with ephemeral/ short perennial vegetation becoming established

c. Long Strip Woodland (within the Pipe Rack and Jetty Access Road) – this is a narrow (c. 40m) band of mature ash and oak woodland that is bound by the Associated Petroleum Terminal site to the north, and a large arable field to the south. Laporte Road runs along the south-western boundary, and the woodland terminates at its northernmost point where it meets the flood embankment fronting the Humber Estuary. A public right of way runs along the south-eastern boundary of the woodland connecting Laporte Road to the coastal footpath/ bridleway that runs along the top of the flood embankment.

1.3.2 No other areas of habitat within the Project boundary were identified as having habitats with the potential to support anything other than a very small number of common species of nesting birds,and were therefore scoped out of further survey effort for breeding birds.

**Survey Scope**

1.3.3 The scope of works for the breeding bird surveys within the Survey Area defined above was as follows:

a. Five walked transects to be conducted covering all parts of the site to be lost/ damaged within Site Boundary (referred to as the ‘Survey Area’).

b. Maps showing the distribution of birds within the Survey Area with notes on breeding behaviour (singing, display flights, courtship etc.) as necessary.

c. Identify any important breeding bird species or assemblages within the Project Site Boundary and within adjacent areas where there may be potential for direct and indirect effects.

d. Use information gathered on the breeding bird assemblage of the Site to inform mitigation/compensation and enhancement opportunities as appropriate.

1.3.4 Habitats within the West Site were surveyed in 2022. Following changes to the Project and red line boundary, habitats within the East Site – Ammonia Storage site and Long Strip Woodland were surveyed in 2023.

**Method**

1.3.5 All survey work and reporting has been undertaken and reviewed by suitably qualified ecologists who are full members of the Chartered Institute of Ecology and Environmental Management.

1.3.6 The Survey Area was visited on five occasions during the bird breeding season (late April – mid June), following an amended Common Bird Census methodology (Ref 1-3). On each visit, an experienced AECOM ornithologist walked along a transect to cover the Survey Area and immediate surrounding area (up to around 200m from the Site boundary, where visible from accessible land), and identified all birds present. Records were made as to whether the bird was seen or heard (calling or singing), and further details were made, including evidence of bird nesting behaviour and activity (e.g. bird carrying food, nesting material or occupied nest seen).

1.3.7 Optimal times for breeding bird survey occur between dawn and mid-morning (approximately 10:30) and from early evening (approximately 17:30) to dusk. During these times, breeding birds are more active and can be detected in song more frequently. The surveys were carried out in the West Site within these time frames with all five surveys carried out in the morning. For the East Site – Ammonia Storage site and Long Strip Woodland, the survey timing was pushed later in the day to avoid the dawn period, due to the limitations to the surveyor in adequately recording birdsong in the dawn period in these habitat types. However, this is not considered to represent a limitation to the survey data, which adequately recorded the species, breeding status and distribution within the habitats to establish a reasonable estimate as to the breeding assemblage present and thus the nature conservation status of the habitats for nesting birds.

1.3.8 The survey duration for each transect was approximately two hours. Surveys were carried out as far as possible on days with little or no wind, rain or mist in order to maximise the potential for detection of birds by sound as well as sight and also to avoid the possibility of bird activity being suppressed by inclement weather conditions.

1.3.9 Contacts with birds (by song, call or sighting) were marked on the survey map using British Trust for Ornithology ("BTO") two-letter species codes and standard symbols to record behaviour. Typically a number of records for a specific species are clustered across the survey visits, which allows an estimation of breeding numbers of each species to be carried out.

1.3.10 The timings, dates and weather conditions for the surveys are detailed in **Table 6** and **Table 7**.

**Table 6: Dates and Weather Conditions for Breeding Bird Surveys (West Site)**

| Visit Number | Date | Sunrise | Survey Times | Weather Conditions |
|---|---|---|---|---|
| 1 | 17/03/2022 | 06:10 | 08:00 – 10:00 | F2SW, 11-13°C, cloud cover 0/8, dry |
| 2 | 11/04/2022 | 06:00 | 08:30 – 10:30 | F2SE, 9-11°C, cloud cover 6/8, dry |
| 3 | 05/05/2022 | 05:15 | 06:15 – 08:15 | F1W 9-11°C, cloud cover 2/8, dry |
| 4 | 21/05/2022 | 04:30 | 08:00 – 10:00 | F1SW, 17-19°C, cloud cover 2/8, dry |
| 5 | 25/05/22 | 04:45 | 05:45 – 07:45 | F2SW, 11-12°C, cloud cover 7/8, dry |

**Table 7: Dates and Weather Conditions for Breeding Bird Surveys (East Site – Ammonia Storage site and Long Strip Woodland)**

| Visit Number | Date | Sunrise | Survey Times | Weather Conditions |
|---|---|---|---|---|
| 1 | 03/03/2023 | 06:45 | 09:25 – 11:25 | F1-2N, 6°C, cloud cover 8/8, dry |
| 2 | 31/03/2023 | 06:38 | 09:35 – 11:15 | F1-2E, 11-12°C, cloud cover 8/8, dry |
| 3 | 18/04/2023 | 05:54 | 10:00 – 12:00 | F2E, 10°C cloud cover 1/8, dry |
| 4 | 05/05/2023 | 05:18 | 11:45 – 13:15 | F1SW, 12°C, cloud cove 6/8, dry |
| 5 | 19/05/2023 | 04:54 | 09:35 – 11:00 | F2SW, 20°C, cloud cover 2/8, dry (heavy rain previous day) |

### Results

1.3.11 The species recorded within each part of the Survey Area and their breeding status are stated in **Table 8**. Detailed territory mapping was not undertaken given the density of the woodland habitats present within Long Strip woodland, and the scrub habitats present within East Site – Ammonia Storage site; however, it was possible to estimate of the number of territories within the West Site Survey Area.

**Table 8: Breeding Bird Survey Results**

| English Name | Scientific Name | Birds of Conservation Concern 5 (BOCC5) | Annex 1 of the EU Birds Directive (Annex 1) | Schedule 1 Wildlife and Countryside Act 1981 (Schedule 1) | UK Biodiversity Action Plan Priority Species (UK BAP) | NERC Act 2006 | Breeding Status: Confirmed, Probable, Possible or Not Breeding (Estimated number of territories listed in brackets where assessed) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | West Site | East Site – Ammonia Storage site | Long Strip Woodland |
| Pheasant | *Phasianus colchicus* | | | | | | Probable (1) | Possible | Possible |
| Woodpigeon | *Columba palumbus* | Amber | | | | | Probable (2) | Probable | Probable |
| Blue Tit | *Cyanistes caeruleus* | | | | | | Possible (1) | Confirmed | Confirmed |
| Great Tit | *Parus major* | | | | | | Possible (1) | Confirmed | Confirmed |
| Skylark | *Alauda arvensis* | Red | | | ✓ | s.41 species | Probable (1) | | |
| Cetti's Warbler | *Cettia cetti* | | | ✓ | | | Probable (1) | | Possible |
| Long-tailed Tit | *Aegithalos caudatus* | | | | | | Probable (1) | Confirmed | Confirmed |
| Willow Warbler | *Phylloscopus trochilus* | Amber | | | | | Probable (1) | | |
| Chiffchaff | *Phylloscopus collybita* | | | | | | Probable (1) | Probable | Probable |
| Sedge Warbler | *Acrocephalus schoenobaenus* | Amber | | | | | Probable (3) | | Possible |
| Reed Warbler | *Acrocephalus scirpaceus* | | | | | | Probable (2) | | |
| Blackcap | *Sylvia atricapilla* | | | | | | Possible (1) | Probable | Probable |
| Whitethroat | *Sylvia communis* | | | | | | Probable (3) | | Possible |
| Wren | *Troglodytes troglodytes* | Amber | | | | | Probable (4) | Confirmed | Confirmed |
| Blackbird | *Turdus merula* | | | | | | Probable (1) | Confirmed | Confirmed |
| Song Thrush | *Turdus philomelos* | Amber | | | ✓ | s.41 species | Probable (1) | | Possible |
| Robin | *Erithacus rubecula* | | | | | | Probable (1) | Probable | Probable |

| English Name | Scientific Name | Birds of Conservation Concern 5 (BOCC5) | Annex 1 of the EU Birds Directive (Annex 1) | Schedule 1 Wildlife and Countryside Act 1981 (Schedule 1) | UK Biodiversity Action Plan Priority Species (UK BAP) | NERC Act 2006 | Breeding Status: Confirmed, Probable, Possible or Not Breeding (Estimated number of territories listed in brackets where assessed) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | West Site | East Site – Ammonia Storage site | Long Strip Woodland |
| Meadow Pipit | *Anthus pratensis* | Amber | | | | | Probable (1) | | |
| Chaffinch | *Fringilla coelebs* | | | | | | Probable (1) | Probable | Probable |
| Linnet | *Linaria cannabina* | Red | | | ✓ | s.41 species | Probable (1) | Not breeding | |
| Goldfinch | *Carduelis carduelis* | | | | | | Probable (1) | Probable | Probable |
| Reed Bunting | *Emberiza schoeniclus* | Amber | | | ✓ | s.41 species | Probable (3) | | |
| Magpie | *Pica pica* | | | | | | Not breeding | Possible | |
| Carrion crow | *Corvus corone* | | | | | | Not breeding | Possible | |
| Dunnock | *Prunella modularis* | Amber | | | ✓ | s.41 species | Not breeding | Possible | |
| Yellowhammer | *Emberiza citrinella* | Red | | | ✓ | s.41 species | Not breeding | | |
| Bullfinch | *Pyrrhula pyrrhula* | Amber | | | | s.41 species | | | Possible |
| Buzzard | *Buteo buteo* | | | | | | | Possible | |
| Garden warbler | *Sylvia borin* | | | | | | | | Not breeding |
| Goldcrest | *Regulus regulus* | | | | | | | Not breeding | |
| Great spotted woodpecker | *Dendrocopus major* | | | | | | | | Possible |
| Lesser whitethroat | *Curruca curruca* | | | | | | | | Possible |
| Redwing | *Turdus iliacus* | Amber | | | | | | Not breeding | |
| Stock dove | *Columba oenus* | Amber | | | | | | | Possible |
| Swallow | *Hirundo rustica* | | | | | | | Not breeding | |
| Total number of confirmed/ probable/ possible breeding species | | | | | | | 22 | 16 | 20 |

## 1.4. References

Ref 1-1 Bibby *et al* (2000). *Bird Census Techniques*. Academic Press, London.

Ref 1-2 Gilbert *et al* (1998). *Bird Monitoring Methods: A Manual of Techniques for Key UK Species*. The Royal Society for the Protection of Birds, Sandy.

Ref 1-3 Bibby CJ, Burgess ND, Hill DA and Mustoe SH (2000). *Bird Census Techniques, 2nd Edition*. Academic Press, London; Marchant, J.H. (1983) *Common Birds Census instructions*. BTO, Tring. 12pp.

# Figure 1A Bird Survey Results

Revision: 1 Drawn: EB Checked: DF Approved: JA Date: 2024-04-15

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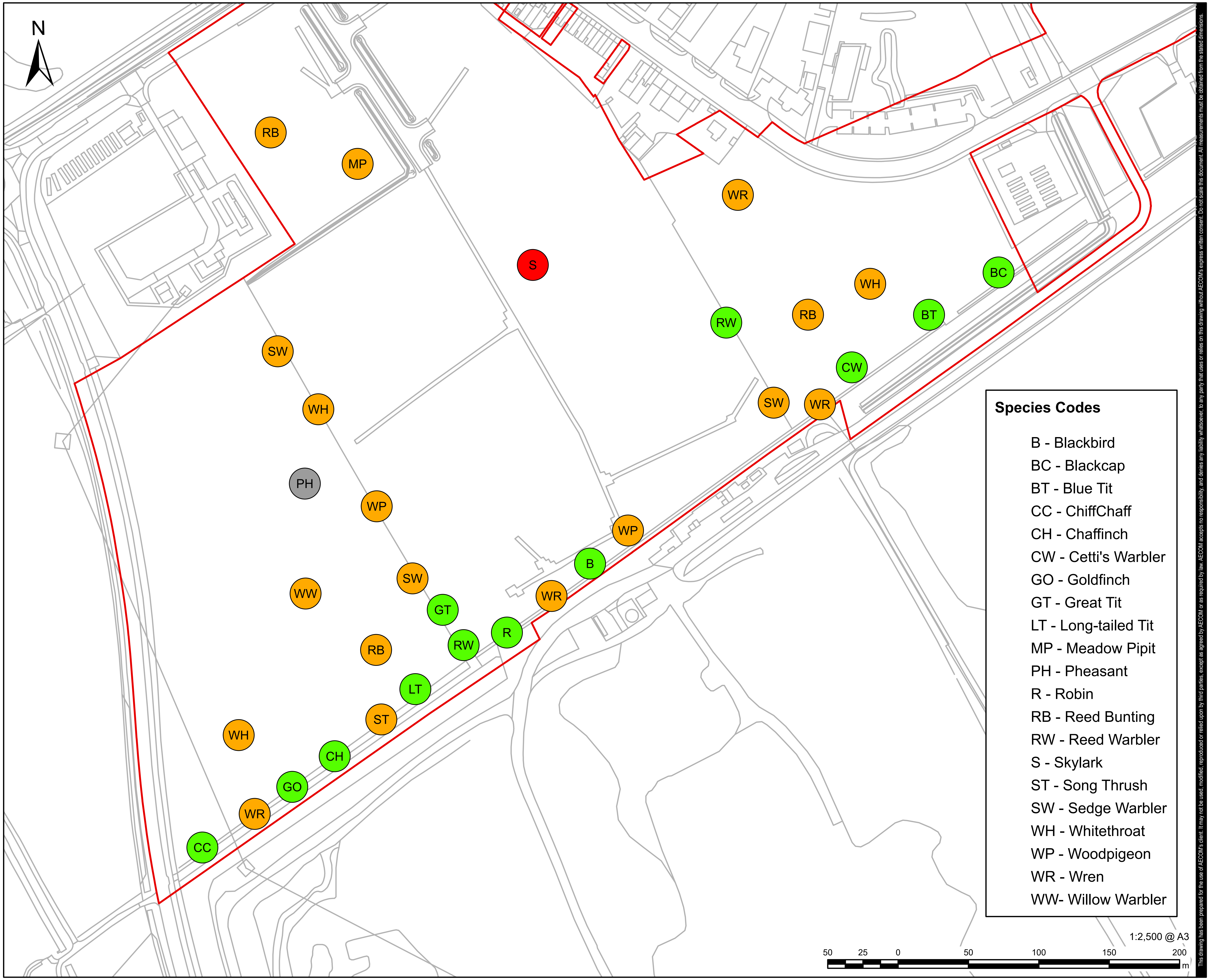




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**LEGEND**

Site Boundary

RSPB Conservation Status (2021)

- Red
- Amber
- Green
- No Status

**NOTES**



**ISSUE PURPOSE**

Environmental Statement

**PROJECT NUMBER**

60673509

**DEVELOPMENT CONSENT ORDER NO**

TR030008

**FIGURE TITLE**

Bird Survey Results

**FIGURE NUMBER**

Figure 1a

# Figure 1B Bird Survey Results

Revision: 1 Drawn: EB Checked: DF Approved: JA Date: 2023-09-04

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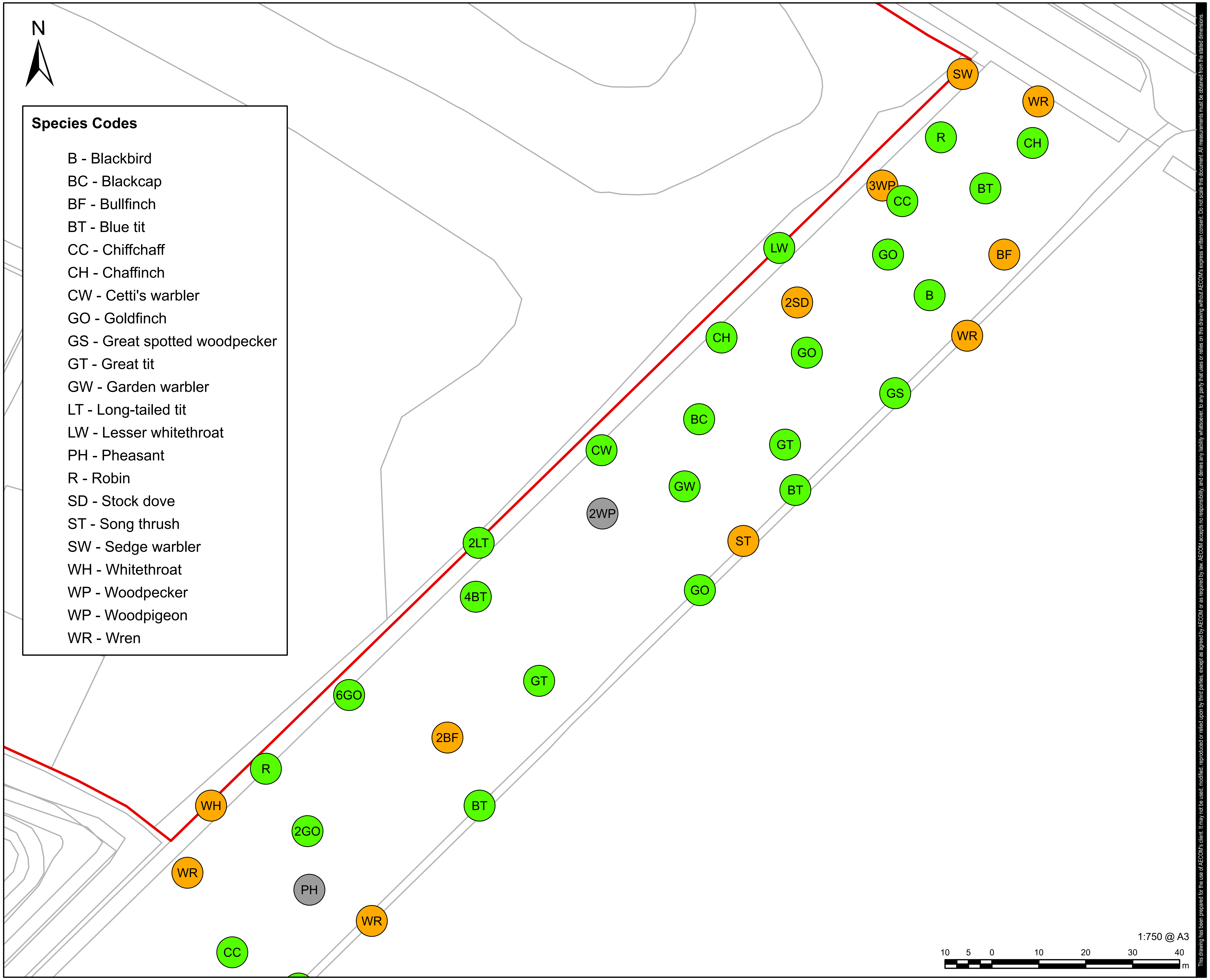




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**LEGEND**

Site Boundary

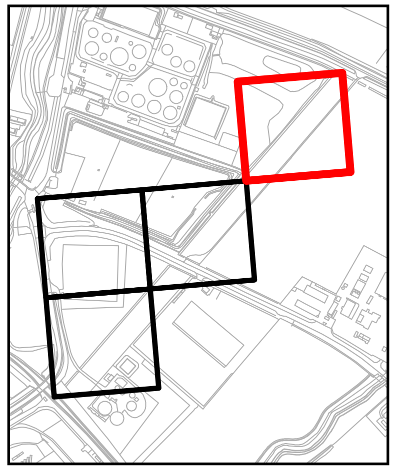
RSPB Conservation Status (2021)

Red

Amber

Green

No Status



**NOTES**

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**ISSUE PURPOSE**

Environmental Statement

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**DEVELOPMENT CONSENT ORDER NO**

TR030008

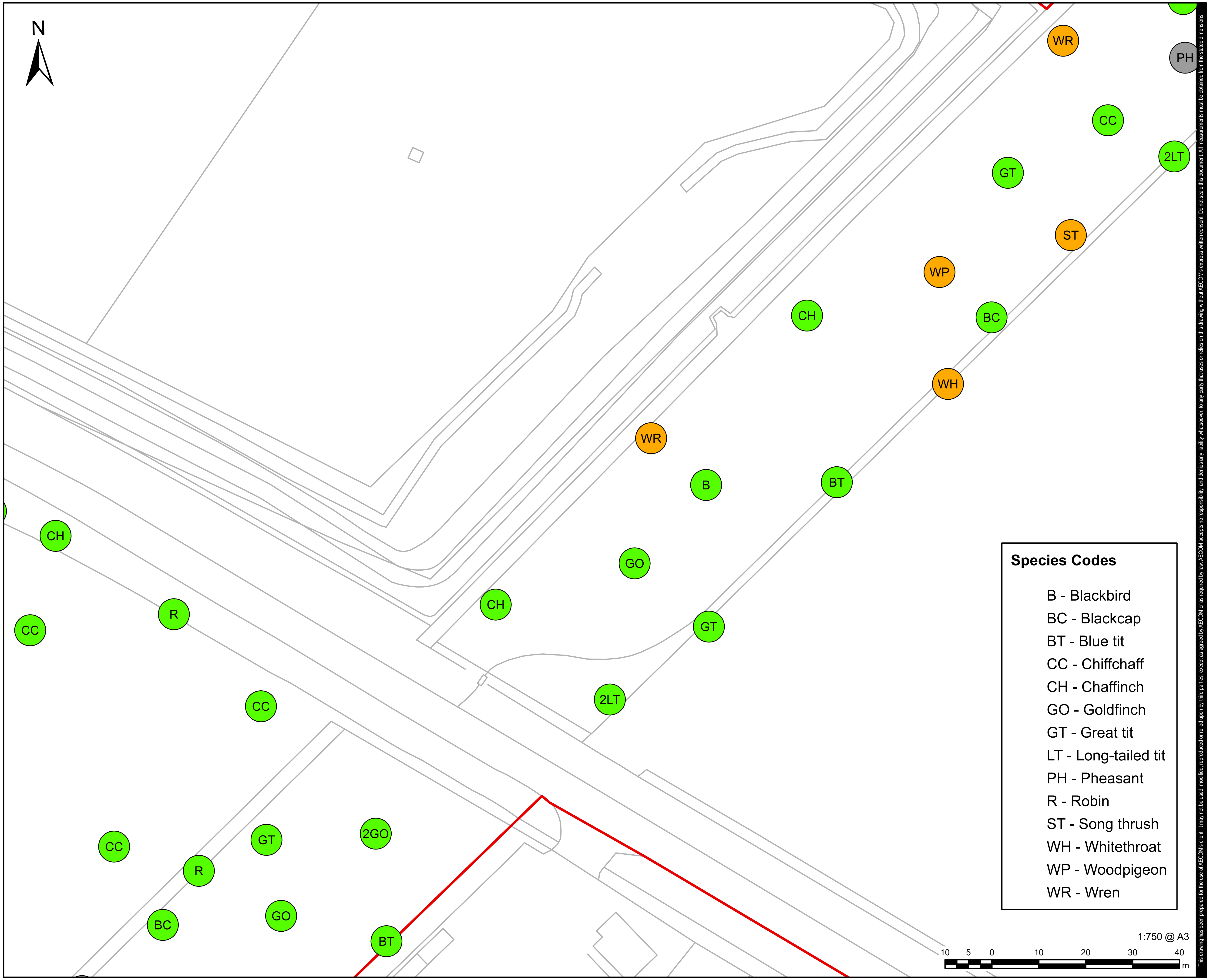
**FIGURE TITLE**

Bird Survey Results - Sheet 1 of 4

**FIGURE NUMBER**

Figure 1b

Revision: 1 Drawn: EB Checked: DF Approved: JA Date: 2023-09-04

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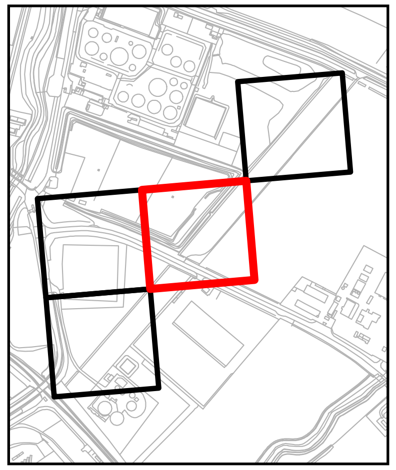
**LEGEND**

Site Boundary

RSPB Conservation Status (2021)

- Red
- Amber
- Green
- No Status



**NOTES**



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Environmental Statement

**PROJECT NUMBER**

60673509

**DEVELOPMENT CONSENT ORDER NO**

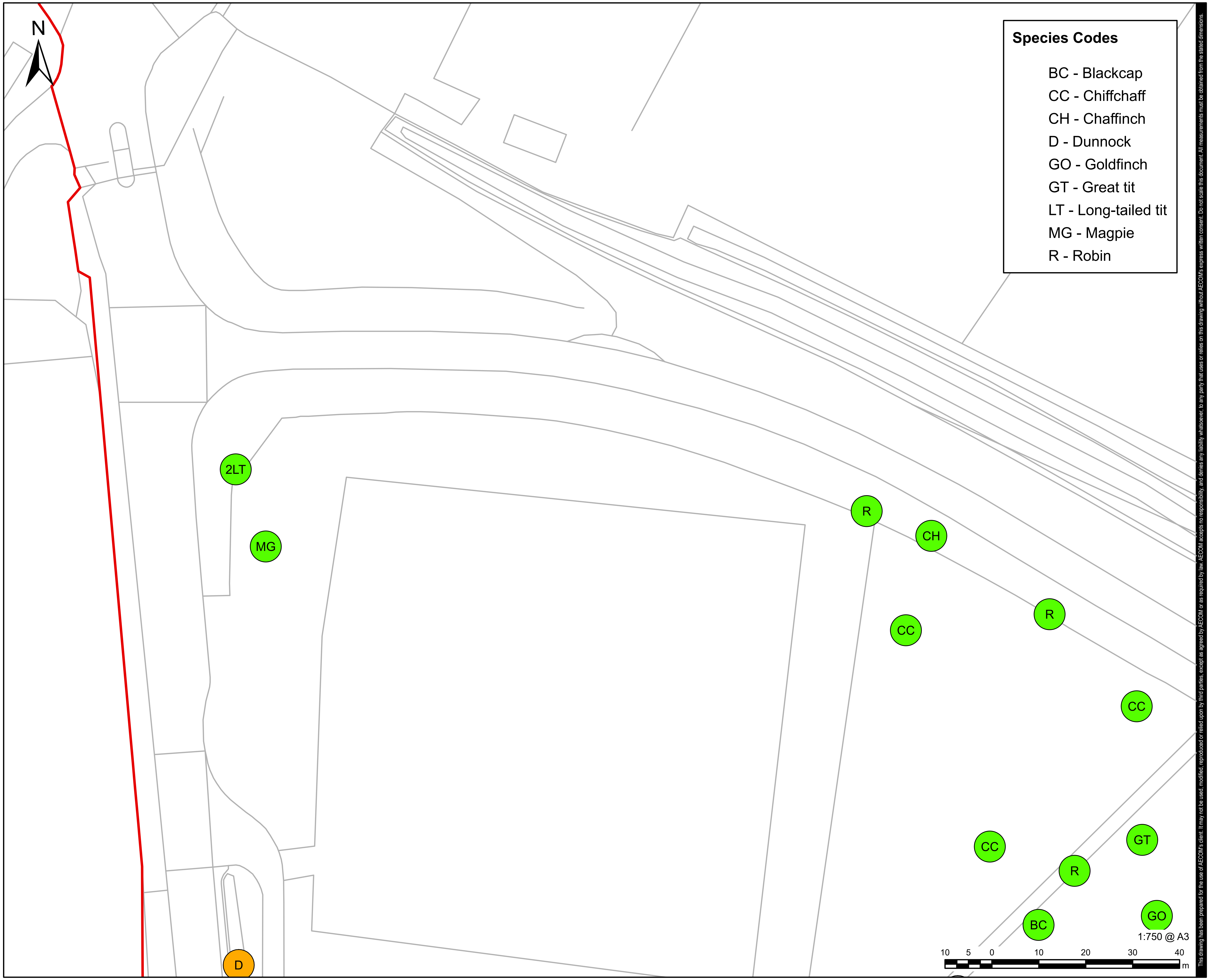
TR030008

**FIGURE TITLE**

Bird Survey Results - Sheet 2 of 4

**FIGURE NUMBER**

Figure 1b



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**LEGEND**

Site Boundary

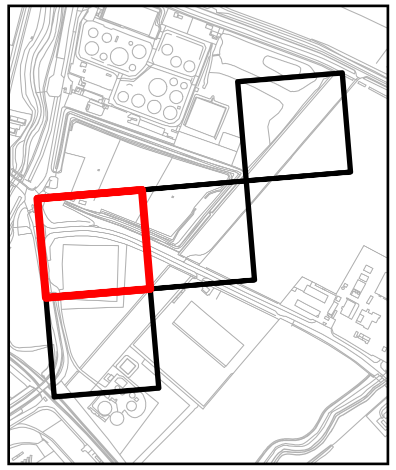
RSPB Conservation Status (2021)

Red

Amber

Green

No Status



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**DEVELOPMENT CONSENT ORDER NO**

TR030008

**FIGURE TITLE**

Bird Survey Results - Sheet 3 of 4

**FIGURE NUMBER**

Figure 1b

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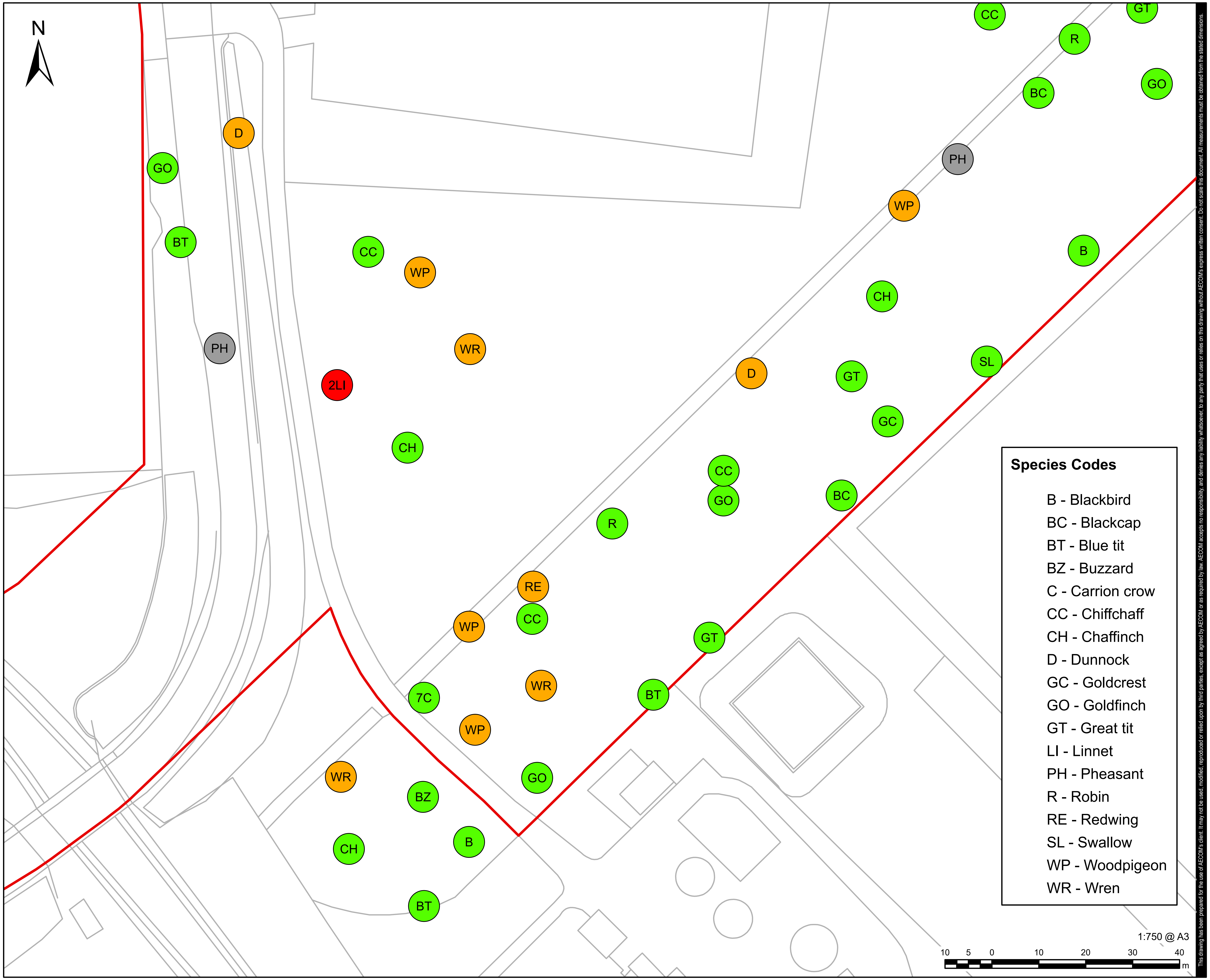


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**LEGEND**

Site Boundary

RSPB Conservation Status (2021)

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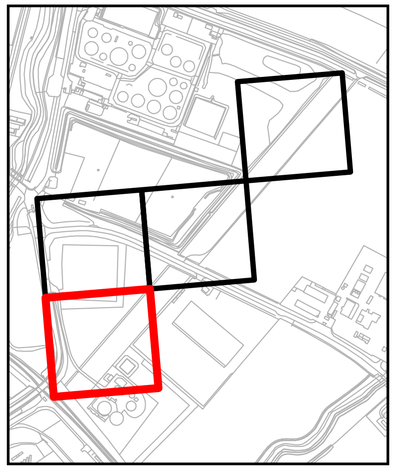
Amber

Green

No Status



**NOTES**



**ISSUE PURPOSE**

Environmental Statement

**PROJECT NUMBER**

60673509

**DEVELOPMENT CONSENT ORDER NO**

TR030008

**FIGURE TITLE**

Bird Survey Results - Sheet 4 of 4

**FIGURE NUMBER**

Figure 1b

# Figure 2 Terrestrial Wintering Bird Survey Area

Filename: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\Legacy\UKMCR1FP002-V1\E\Proposal\3512\Immingham GET GIS\02_Maps\Environmental Statement\IGET_ES_CH10_Appendix_10A_Fig2_Terrestrial_Wintering_Bird_Survey_Areas_20230821_EB.aprx

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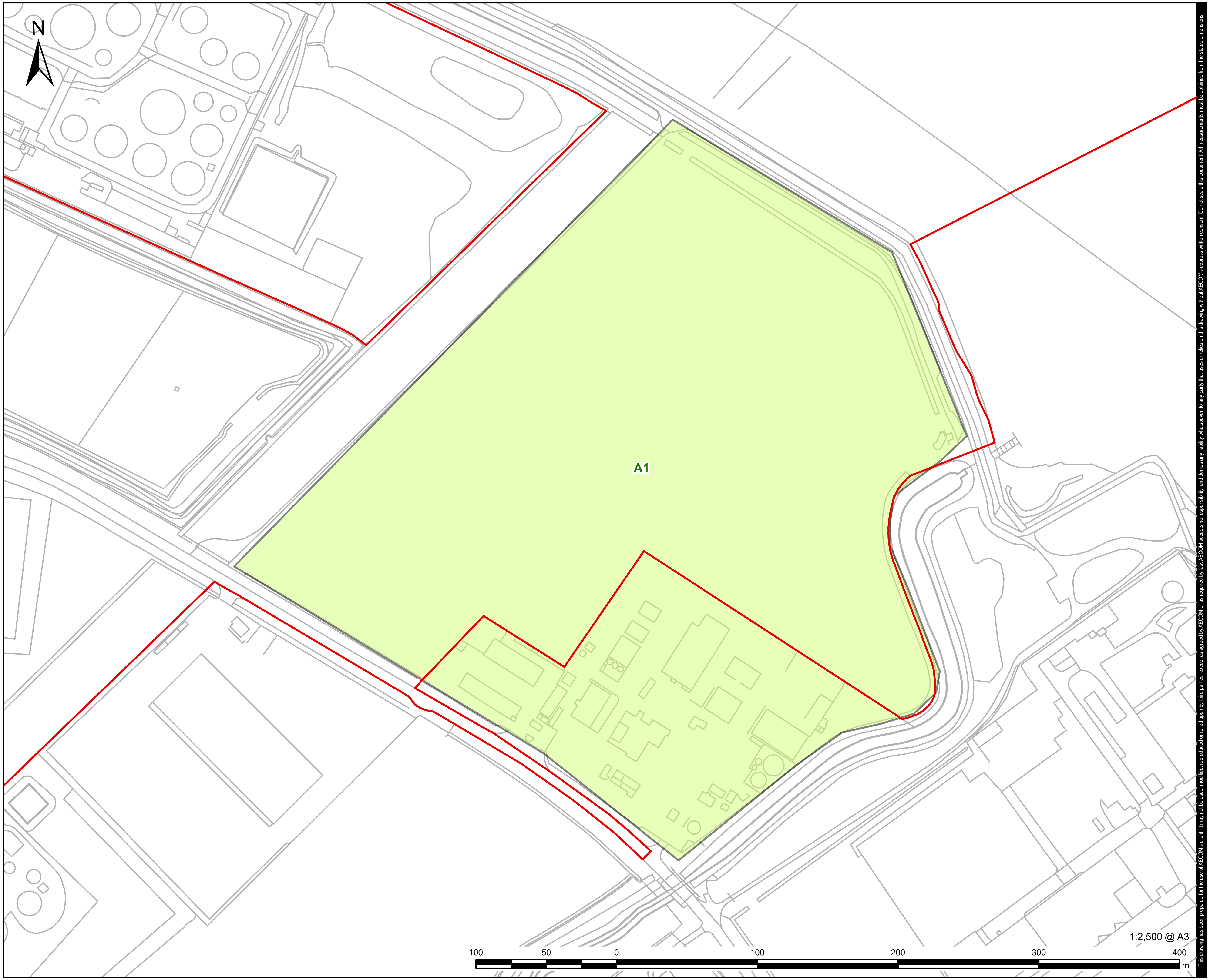




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**LEGEND**

- Site Boundary
- Terrestrial Wintering Bird Survey Area

**NOTES**



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**PROJECT NUMBER**

60673509

**DEVELOPMENT CONSENT ORDER NO**

TR030008

**FIGURE TITLE**

Terrestrial Wintering Bird Survey Area

**FIGURE NUMBER**

Figure 2

# ANNEX A.2 Bird Count Data

## Table A2.1 Peak counts of coastal waterbird species recorded within Sector A over the 5-year period between 2017/18 to 2021/22

| Species | Peak count per winter (feeding) | | | | | | Peak count per winter (Roosting) | | | | | | Peak count per winter (combined – non-behavioural) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | MP | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | MP | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | MP |
| **Avocet** | 104 | 223 | 270 | 171 | 252 | 204 | 81 | 251 | 243 | 146 | 165 | 177 | 104 | 251 | 270 | 171 | 252 | 210 |
| **Bar-tailed Godwit** | 2 | 14 | 4 | 0 | 2 | 4 | 0 | 0 | 0 | 1 | 0 | 0.2 | 2 | 14 | 4 | 1 | 2 | 5 |
| Black-headed Gull | 0 | 0 | 0 | 21 | 26 | 9 | 0 | 0 | 0 | 0 | 46 | 9 | 0 | 0 | 0 | 21 | 46 | 13 |
| **Black-tailed Godwit** | 126 | 2,183 | 515 | 1,950 | 5,500 | 2,055 | 2,070 | 1,950 | 2,350 | 2,828 | 720 | 1,984 | 2,070 | 2,183 | 2,350 | 2,828 | 5,500 | 2,986 |
| Common Gull | 0 | 0 | 0 | 4 | 14 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 4 |
| Common Sandpiper | 0 | 0 | 0 | 1 | 1 | 0.4 | 0 | 0 | 0 | 0 | 1 | 0.2 | 0 | 0 | 0 | 1 | 1 | 0.4 |
| Cormorant | 0 | 4 | 3 | 3 | 3 | 3 | 0 | 2 | 3 | 3 | 3 | 2 | 0 | 4 | 3 | 3 | 3 | 3 |
| Curlew† | 32 | 63 | 99 | 71 | 64 | 66 | 68 | 82 | 39 | 120 | 42 | 70 | 68 | 82 | 99 | 120 | 64 | 87 |
| **Dunlin** | 680 | 512 | 592 | 557 | 474 | 563 | 22 | 22 | 850 | 122 | 130 | 229 | 680 | 512 | 850 | 557 | 474 | 615 |
| **Golden Plover** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 0.8 |
| Great Black-backed Gull | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 0.2 | 0 | 0 | 0 | 0 | 4 | 0.8 |
| Grey Heron | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 1 | 1 | 0.4 |
| Grey Plover† | 0 | 1 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 1 |
| Greylag Goose | 0 | 27 | 47 | 21 | 10 | 21 | 0 | 3 | 0 | 2 | 5 | 2 | 0 | 27 | 47 | 21 | 10 | 21 |
| Herring Gull | 0 | 0 | 0 | 1 | 5 | 1 | 0 | 0 | 0 | 1 | 7 | 2 | 0 | 0 | 0 | 1 | 7 | 2 |
| **Knot** | 2 | 22 | 5 | 18 | 0 | 9 | 0 | 68 | 14 | 18 | 0 | 20 | 2 | 68 | 14 | 18 | 0 | 20 |
| Lapwing† | 1054 | 772 | 320 | 201 | 715 | 612 | 2,374 | 1,254 | 829 | 2,932 | 846 | 1,647 | 2,374 | 1,254 | 829 | 2,932 | 846 | 1,647 |
| Lesser Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.4 | 0 | 0 | 0 | 0 | 2 | 0.4 |
| Little Egret | 1 | 0 | 1 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 0.2 | 1 | 0 | 1 | 3 | 3 | 2 |
| Little Stint | 0 | 0 | 1 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.2 |
| Mallard† | 22 | 10 | 6 | 5 | 28 | 14 | 0 | 3 | 0 | 2 | 0 | 1 | 22 | 10 | 6 | 5 | 28 | 14 |
| Mute Swan | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0.8 |
| Oystercatcher† | 8 | 4 | 5 | 6 | 4 | 5 | 1 | 2 | 4 | 2 | 1 | 2 | 8 | 4 | 5 | 6 | 4 | 5 |
| Pink-footed Goose | 0 | 0 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.2 |
| Purple Sandpiper | 0 | 0 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.2 |
| **Redshank** | 204 | 112 | 177 | 245 | 260 | 200 | 40 | 124 | 62 | 141 | 72 | 88 | 204 | 124 | 177 | 245 | 260 | 202 |
| Ringed Plover† | 19 | 24 | 8 | 4 | 17 | 14 | 0 | 2 | 5 | 2 | 0 | 2 | 19 | 24 | 8 | 4 | 17 | 14 |
| Ruff† | 0 | 0 | 0 | 0 | 1 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 |
| Sanderling† | 0 | 2 | 0 | 0 | 0 | 0.4 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 2 | 3 | 0 | 0 | 1 |
| **Shelduck** | 76 | 56 | 28 | 65 | 14 | 48 | 6 | 28 | 14 | 26 | 14 | 18 | 76 | 56 | 28 | 65 | 14 | 48 |
| Shoveler | 0 | 0 | 14 | 0 | 0 | 3 | 0 | 0 | 14 | 0 | 0 | 3 | 0 | 0 | 14 | 0 | 0 | 3 |
| Snipe | 4 | 15 | 24 | 1 | 18 | 12 | 0 | 0 | 3 | 22 | 14 | 8 | 4 | 15 | 24 | 22 | 18 | 17 |
| Teal† | 888 | 391 | 1,620 | 329 | 2,560 | 1,158 | 1,016 | 742 | 1,623 | 1,111 | 2,560 | 1,410 | 1,016 | 742 | 1,623 | 1,111 | 2,560 | 1,410 |
| Turnstone† | 17 | 12 | 21 | 2 | 12 | 13 | 0 | 37 | 0 | 0 | 0 | 7 | 17 | 37 | 21 | 2 | 12 | 18 |
| Wigeon† | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0.4 | 0 | 4 | 0 | 0 | 2 | 1 |

SPA qualifying species highlighted in **bold**. † Species with this symbol are included as named components of the SPA waterfowl assemblage.

| | |
|---|---|
| (green) | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that for the Common Sandpiper, Grey Heron, Little Stint, and Ruff the local importance threshold is < 1. |
| (orange) | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that the regional importance threshold for the Little Stint was <1. |
| (blue) | Cells highlighted blue indicate the count is of national importance. It should be noted that for Avocet and Black-tailed Godwit the regional importance threshold (> 10% of the estuary wide WeBS 5-year mean peak (258 and 565 birds respectively) is higher than the national importance threshold (87 and 390 birds respectively). The national importance threshold for the Common Sandpiper and Little Stint is set as 1. |
| (red) | Cells highlighted red indicate the count is of international importance. |

**Table A2.2. Peak counts of coastal waterbird species recorded within Sector B over the 5-year period between between 2017/18 to 2021/22**

| Species | Peak count per winter (feeding) | | | | | | Peak count per winter (Roosting) | | | | | | Peak count per winter (combined – non-behavioural) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | MP | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | MP | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | MP |
| Arctic Tern | 0 | 0 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 1 | 0 | 0.2 |
| **Avocet** | 0 | 0 | 0 | 0 | 1 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 |
| **Bar-tailed Godwit** | 2 | 22 | 10 | 8 | 16 | 12 | 0 | 12 | 12 | 1 | 5 | 6 | 2 | 22 | 12 | 8 | 16 | 12 |
| Black-headed Gull | 0 | 0 | 0 | 49 | 210 | 52 | 0 | 0 | 0 | 24 | 152 | 35 | 0 | 0 | 0 | 49 | 210 | 52 |
| **Black-tailed Godwit** | 286 | 563 | 303 | 1,300 | 532 | 597 | 6 | 222 | 3 | 38 | 390 | 132 | 286 | 563 | 303 | 1,300 | 532 | 597 |
| Common Gull | 0 | 0 | 0 | 55 | 16 | 14 | 0 | 0 | 0 | 55 | 663 | 144 | 0 | 0 | 0 | 55 | 663 | 144 |
| Common Sandpiper | 0 | 0 | 0 | 2 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 1 |
| Common Tern | 0 | 0 | 0 | 30 | 0 | 6 | 0 | 0 | 0 | 30 | 0 | 6 | 0 | 0 | 0 | 30 | 0 | 6 |
| Cormorant | 4 | 3 | 2 | 14 | 3 | 5 | 14 | 6 | 14 | 14 | 15 | 13 | 14 | 6 | 14 | 14 | 15 | 13 |
| Curlew† | 12 | 12 | 11 | 12 | 12 | 12 | 6 | 7 | 8 | 8 | 7 | 7 | 12 | 12 | 11 | 12 | 12 | 12 |
| **Dunlin** | 270 | 115 | 638 | 494 | 474 | 398 | 120 | 2 | 300 | 494 | 360 | 255 | 270 | 115 | 638 | 494 | 474 | 398 |
| **Golden Plover** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.2 | 0 | 0 | 1 | 0 | 0 | 0.2 |
| Great Black-backed Gull | 0 | 0 | 0 | 2 | 5 | 1 | 0 | 0 | 0 | 2 | 22 | 5 | 0 | 0 | 0 | 2 | 22 | 5 |
| Greenshank | 0 | 1 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.2 |
| Grey Heron | 0 | 1 | 1 | 0 | 0 | 0.4 | 0 | 0 | 1 | 0 | 0 | 0.2 | 0 | 1 | 1 | 0 | 0 | 0.4 |
| Grey Plover† | 0 | 0 | 1 | 1 | 2 | 0.8 | 1 | 0 | 1 | 0 | 0 | 0.4 | 1 | 0 | 1 | 1 | 2 | 1 |
| Herring Gull | 0 | 0 | 0 | 5 | 12 | 3 | 0 | 0 | 0 | 2 | 7 | 2 | 0 | 0 | 0 | 5 | 12 | 3 |
| **Knot** | 0 | 23 | 14 | 0 | 4 | 8 | 0 | 4 | 10 | 0 | 0 | 3 | 0 | 23 | 14 | 0 | 4 | 8 |
| Lapwing† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0.4 | 0 | 1 | 0 | 0 | 1 | 0.4 |
| Lesser Black-backed Gull | 0 | 0 | 0 | 8 | 3 | 2 | 0 | 0 | 0 | 8 | 8 | 3 | 0 | 0 | 0 | 8 | 8 | 3 |
| Little Egret | 0 | 0 | 0 | 1 | 2 | 0.6 | 0 | 1 | 0 | 0 | 1 | 0.4 | 0 | 1 | 0 | 1 | 2 | 0.8 |
| Little Ringed Plover | 0 | 0 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.2 |
| Mallard | 4 | 8 | 0 | 7 | 3 | 4 | 6 | 2 | 0 | 7 | 4 | 4 | 6 | 8 | 0 | 7 | 4 | 5 |
| Mute swan | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 | 0 | 0 | 0 | 0 | 0.2 |
| Oystercatcher† | 8 | 10 | 8 | 12 | 7 | 9 | 5 | 6 | 4 | 4 | 4 | 5 | 8 | 10 | 8 | 12 | 7 | 9 |
| **Redshank** | 204 | 166 | 125 | 153 | 209 | 171 | 110 | 121 | 110 | 153 | 140 | 127 | 204 | 166 | 125 | 153 | 209 | 171 |
| Ringed Plover† | 12 | 1 | 7 | 5 | 5 | 6 | 0 | 0 | 0 | 0 | 1 | 0.2 | 12 | 1 | 7 | 5 | 5 | 6 |
| **Shelduck** | 69 | 56 | 70 | 67 | 55 | 63 | 74 | 39 | 45 | 46 | 58 | 52 | 74 | 56 | 70 | 67 | 58 | 65 |
| Teal† | 11 | 21 | 9 | 27 | 88 | 31 | 1 | 9 | 3 | 27 | 71 | 22 | 11 | 21 | 9 | 27 | 88 | 31 |
| Turnstone† | 35 | 33 | 29 | 28 | 34 | 32 | 15 | 5 | 6 | 2 | 14 | 8 | 35 | 33 | 29 | 28 | 34 | 32 |
| Woodcock | 1 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 |

SPA qualifying species highlighted in bold. † Species with this symbol are included as named components of the SPA waterfowl assemblage.

| | |
|---|---|
| | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that for the Arctic Tern, Common Sandpiper, Greenshank, Grey Heron, Little Ringed Plover, and Woodcock the local importance threshold is < 1. |
| | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that the regional importance threshold for the Arctic Tern, Little Ringed Plover, and Woodcock are <1. |
| | Cells highlighted blue indicate the count is of national importance. It should be noted that for Black-tailed Godwit and Common Sandpiper the regional importance threshold (> 10% of the estuary wide WeBS 5-year mean peak (565 and 4 birds respectively) is higher than the national importance threshold (390 and 1 birds respectively). |
| | Cells highlighted red indicate the count is of international importance. |

**Table A2.3. Coastal waterbird species recorded within Sector A during October 2021 to September 2022 (peak counts – feeding and roosting).**

| Species | Peak count (feeding) | | | | | | | | | | | | Peak count(roosting) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| **Avocet** | 171 | 15 | 0 | 0 | 0 | 115 | 7 | 5 | 6 | 18 | 8 | 225 | 146 | 99 | 0 | 0 | 35 | 92 | 12 | 0 | 24 | 19 | 0 | 165 |
| Barnacle goose | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Bar-tailed Godwit** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Black-headed Gull | 0 | 0 | 0 | 0 | 0 | 21 | 56 | 16 | 43 | 181 | 137 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 6 | 62 | 205 | 137 | 19 |
| **Black-tailed Godwit** | 1,950 | 4 | 0 | 6 | 30 | 15 | 25 | 44 | 121 | 176 | 420 | 3,620 | 2,828 | 28 | 0 | 578 | 142 | 0 | 0 | 7 | 131 | 166 | 0 | 720 |
| Canada Goose | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Common Gull | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 2 | 2 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 0 |
| Common Sandpiper | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Cormorant | 1 | 1 | 1 | 0 | 0 | 3 | 0 | 1 | 1 | 0 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 3 |
| Curlew† | 54 | 9 | 25 | 71 | 24 | 50 | 47 | 11 | 19 | 33 | 17 | 42 | 35 | 18 | 108 | 120 | 71 | 78 | 4 | 3 | 4 | 3 | 2 | 1 |
| **Dunlin** | 181 | 163 | 557 | 181 | 215 | 40 | 30 | 25 | 0 | 9 | 0 | 32 | 122 | 0 | 2 | 36 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Great Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Grey Heron | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grey Plover† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Greylag Goose | 21 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | 0 | 0 |
| Herring Gull | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 8 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 7 | 12 | 3 | 4 |
| **Knot** | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lapwing† | 0 | 201 | 21 | 0 | 0 | 4 | 1 | 4 | 49 | 22 | 0 | 3 | 145 | 389 | 509 | 388 | 2,932 | 1 | 2 | 6 | 39 | 68 | 0 | 3 |
| Lesser Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 7 | 6 | 1 |
| Little Egret | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| Mallard† | 0 | 0 | 5 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| Mediterranean Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Oystercatcher† | 0 | 0 | 0 | 1 | 0 | 6 | 4 | 1 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 2 | 2 | 1 | 0 | 0 |
| Pink-footed Goose | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Purple sandpiper | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Redshank** | 169 | 124 | 245 | 123 | 48 | 57 | 64 | 3 | 1 | 201 | 85 | 154 | 141 | 12 | 119 | 27 | 18 | 16 | 8 | 2 | 1 | 10 | 0 | 0 |
| Ringed Plover† | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 48 | 1 | 6 | 9 | 17 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 13 | 0 | 0 | 0 | 0 |
| Ruff† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Shelduck** | 11 | 12 | 21 | 14 | 16 | 65 | 26 | 18 | 21 | 23 | 6 | 8 | 2 | 7 | 14 | 9 | 26 | 15 | 25 | 5 | 10 | 9 | 3 | 7 |
| Snipe | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Teal† | 329 | 174 | 148 | 275 | 164 | 97 | 38 | 0 | 0 | 0 | 0 | 275 | 326 | 831 | 273 | 1111 | 362 | 100 | 44 | 0 | 0 | 0 | 30 | 285 |
| Turnstone† | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Whimbrel† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

SPA qualifying species highlighted in bold. † Species with this symbol are included as named components of the SPA waterfowl assemblage.

| | |
|---|---|
| (green) | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that for the Common Sandpiper, Grey Heron, Mediterranean Gull, Ruff and Whimbrel the local importance threshold is < 1. |
| (orange) | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that the regional importance threshold for the Mediterranean Gull was <1. |
| (blue) | Cells highlighted blue indicate the count is of national importance. It should be noted that for Avocet, Black-tailed Godwit, Common Sandpiper and Whimbrel, the regional importance threshold (> 10% of the estuary wide WeBS 5-year mean peak (258 and 565, 4, and 6 birds respectively) is higher than the national importance threshold which is currently set at 87 and 390 individuals for the avocet and Black-tailed Godwit and 1 individual for both the Common Sandpiper and Whimbrel. |
| (red) | Cells highlighted red indicate the count is of international importance. |

**Table A2.4. Coastal waterbird species recorded within Sector B during October 2021 to September 2022 (peak counts – feeding and roosting)**

| Species | Peak count (feeding) | | | | | | | | | | | | Peak count (roosting) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| **Bar-tailed Godwit** | 8 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 16 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| Black-headed Gull | 0 | 0 | 0 | 0 | 0 | 49 | 30 | 18 | 107 | 171 | 224 | 210 | 0 | 0 | 0 | 0 | 0 | 24 | 2 | 5 | 29 | 34 | 168 | 65 |
| **Black-tailed Godwit** | 589 | 311 | 2 | 1300 | 10 | 341 | 535 | 264 | 102 | 44 | 22 | 109 | 9 | 38 | 1 | 30 | 2 | 3 | 2 | 24 | 29 | 20 | 6 | 7 |
| Common Gull | 0 | 0 | 0 | 0 | 0 | 55 | 0 | 1 | 13 | 7 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 55 | 18 | 0 | 4 | 0 | 8 | 30 |
| Common Sandpiper | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cormorant | 14 | 4 | 5 | 4 | 7 | 10 | 1 | 0 | 0 | 0 | 0 | 1 | 14 | 4 | 5 | 4 | 7 | 10 | 9 | 0 | 7 | 7 | 16 | 15 |
| Curlew† | 12 | 8 | 9 | 11 | 11 | 12 | 13 | 14 | 18 | 18 | 13 | 11 | 7 | 4 | 4 | 2 | 5 | 2 | 1 | 6 | 1 | 4 | 4 | 4 |
| **Dunlin** | 494 | 406 | 174 | 340 | 215 | 169 | 10 | 12 | 0 | 0 | 1 | 108 | 494 | 400 | 100 | 10 | 150 | 0 | 2 | 3 | 0 | 0 | 0 | 2 |
| Great Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 3 | 12 |
| Grey Plover† | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Herring Gull | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 6 | 2 | 3 | 5 | 7 | 0 | 0 | 0 | 0 | 0 | 2 | 10 | 1 | 1 | 1 | 1 | 2 |
| **Knot** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lesser Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 8 | 4 | 2 | 2 | 6 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 8 | 5 | 3 | 3 | 9 | 9 | 8 |
| Little Egret | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Little Ringed Plover | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 6 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mallard† | 0 | 0 | 7 | 2 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 7 | 2 | 0 | 2 | 4 | 1 | 0 | 0 | 0 | 0 |
| Mediterranean Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Oystercatcher† | 0 | 0 | 0 | 1 | 5 | 12 | 8 | 4 | 5 | 5 | 2 | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 2 | 2 | 1 | 1 | 3 | 0 |
| **Redshank** | 153 | 128 | 115 | 105 | 101 | 142 | 124 | 1 | 6 | 111 | 143 | 143 | 153 | 100 | 50 | 3 | 61 | 72 | 107 | 1 | 1 | 74 | 57 | 123 |
| Ringed Plover† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 72 | 0 | 0 | 3 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 0 |
| **Shelduck** | 18 | 48 | 48 | 67 | 24 | 23 | 22 | 15 | 7 | 8 | 23 | 21 | 15 | 32 | 46 | 29 | 18 | 12 | 15 | 15 | 3 | 0 | 8 | 20 |
| Teal† | 0 | 1 | 0 | 21 | 27 | 25 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 18 | 27 | 4 | 2 | 0 | 0 | 0 | 0 | 0 |
| Turnstone† | 28 | 27 | 6 | 24 | 26 | 25 | 24 | 2 | 5 | 29 | 17 | 34 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 2 |
| Whimbrel† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 |

SPA qualifying species highlighted in bold. † Species with this symbol are included as named components of the SPA waterfowl assemblage.

| | |
|---|---|
| (green) | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that for the Common Sandpiper, Mediterranean Gull, and Whimbrel the local importance threshold is < 1. |
| (orange) | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that the regional importance threshold for the Mediterranean Gull was <1. |
| (blue) | Cells highlighted blue indicate the count is of national importance. It should be noted that for Avocet, Black-tailed Godwit, Common Sandpiper and Whimbrel, the regional importance threshold (> 10% of the estuary wide WeBS 5-year mean peak (565, 4, and 6 birds respectively) is higher than the national importance threshold which is currently set at 390 individuals for the Black-tailed Godwit and 1 individual for both the Common Sandpiper and Whimbrel. |
| (red) | Cells highlighted red indicate the count is of international importance. |

**Table A2.5. Coastal waterbird species recorded within Sector A during October 2021 to September 2022 (peak counts – all behaviours)**

| Species | Peak count (all behaviour) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| **Avocet** | 171 | 99 | 0 | 0 | 35 | 115 | 12 | 5 | 24 | 19 | 8 | 225 |
| Barnacle goose | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| **Bar-tailed Godwit** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Black-headed Gull | 0 | 0 | 0 | 0 | 0 | 21 | 56 | 16 | 62 | 205 | 137 | 19 |
| **Black-tailed Godwit** | 2828 | 28 | 0 | 578 | 142 | 15 | 25 | 44 | 131 | 176 | 420 | 3620 |
| Canada Goose | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Common Gull | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 2 | 2 | 8 | 14 |
| Common Sandpiper | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 3 | 1 |
| Cormorant | 1 | 1 | 1 | 0 | 0 | 3 | 0 | 1 | 2 | 1 | 2 | 3 |
| Curlew† | 54 | 18 | 108 | 120 | 71 | 78 | 47 | 11 | 19 | 33 | 17 | 42 |
| **Dunlin** | 181 | 163 | 557 | 181 | 215 | 40 | 30 | 25 | 0 | 9 | 0 | 32 |
| Great Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Grey Heron | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Grey Plover† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Greylag Goose | 21 | 0 | 0 | 0 | 0 | 4 | 2 | 2 | 0 | 0 | 0 | 0 |
| Herring Gull | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 8 | 12 | 3 | 4 |
| **Knot** | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lapwing† | 145 | 389 | 509 | 388 | 2932 | 4 | 2 | 6 | 49 | 68 | 0 | 3 |
| Lesser Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 9 | 6 | 1 |
| Little Egret | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 1 | 2 |
| Mallard† | 2 | 0 | 5 | 0 | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 2 |
| Mediterranean Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Oystercatcher† | 0 | 0 | 0 | 1 | 0 | 6 | 5 | 2 | 4 | 6 | 1 | 0 |
| Pink-footed Goose | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Purple sandpiper | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Redshank** | 169 | 124 | 245 | 123 | 48 | 57 | 64 | 3 | 1 | 201 | 85 | 154 |
| Ringed Plover† | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 48 | 1 | 6 | 9 | 17 |
| Ruff† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| **Shelduck** | 11 | 12 | 21 | 14 | 26 | 65 | 26 | 18 | 21 | 23 | 6 | 8 |
| Snipe | 1 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Teal† | 329 | 831 | 273 | 1,111 | 362 | 100 | 44 | 0 | 0 | 0 | 30 | 285 |
| Turnstone† | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Whimbrel† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 |

SPA qualifying species highlighted in **bold**. † Species with this symbol are included as named components of the SPA waterfowl assemblage.

| | |
|---|---|
| (green) | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that for the Common Sandpiper, Grey Heron, Mediterranean Gull, Ruff and Whimbrel the local importance threshold is < 1. |
| (orange) | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that the regional importance threshold for the Mediterranean Gull was <1. |
| (blue) | Cells highlighted blue indicate the count is of national importance. It should be noted that for Avocet, Black-tailed Godwit, Common Sandpiper and Whimbrel, the regional importance threshold (> 10% of the estuary wide WeBS 5-year mean peak (258 and 565, 4, and 6 birds respectively) is higher than the national importance threshold which is currently set at 87 and 390 individuals for the Avocet and Black-tailed Godwit and 1 individual for both the Common Sandpiper and Whimbrel. |
| (red) | Cells highlighted red indicate the count is of international importance. |

**Table A2.6. Coastal waterbird species recorded within Sector B during October 2021 to September 2022 (peak counts – all behaviours)**

| Species | Peak count (all behaviour) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| Bar-tailed Godwit | 8 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 16 |
| Black-headed Gull | 0 | 0 | 0 | 0 | 0 | 49 | 30 | 18 | 107 | 171 | 224 | 210 |
| Black-tailed Godwit | 589 | 311 | 2 | 1300 | 10 | 341 | 535 | 264 | 102 | 44 | 22 | 109 |
| Common Gull | 0 | 0 | 0 | 0 | 0 | 55 | 18 | 1 | 13 | 7 | 8 | 30 |
| Common Sandpiper | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 5 |
| Cormorant | 14 | 4 | 5 | 4 | 7 | 10 | 9 | 0 | 7 | 7 | 16 | 15 |
| Curlew | 12 | 8 | 9 | 11 | 11 | 12 | 13 | 14 | 18 | 18 | 13 | 11 |
| **Dunlin** | 494 | 406 | 174 | 340 | 215 | 169 | 10 | 12 | 0 | 0 | 1 | 108 |
| Great Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 3 | 12 |
| Grey Plover† | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| Herring Gull | 0 | 0 | 0 | 0 | 0 | 5 | 10 | 6 | 2 | 3 | 5 | 7 |
| **Knot** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Lesser Black-backed Gull | 0 | 0 | 0 | 0 | 0 | 8 | 5 | 3 | 3 | 9 | 9 | 8 |
| Little Egret | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Little Ringed Plover | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 6 | 3 | 0 | 0 |
| Mallard† | 0 | 0 | 7 | 2 | 0 | 2 | 4 | 1 | 0 | 0 | 0 | 3 |
| Mediterranean Gull | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| Oystercatcher† | 0 | 0 | 0 | 1 | 5 | 12 | 8 | 4 | 5 | 5 | 3 | 0 |
| **Redshank** | 153 | 128 | 115 | 105 | 101 | 142 | 124 | 1 | 6 | 111 | 143 | 143 |
| Ringed Plover† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 72 | 0 | 0 | 3 | 5 |
| **Shelduck** | 18 | 48 | 48 | 67 | 24 | 23 | 22 | 15 | 7 | 8 | 23 | 21 |
| Teal† | 0 | 1 | 0 | 21 | 27 | 25 | 16 | 0 | 0 | 0 | 0 | 0 |
| Turnstone† | 28 | 27 | 6 | 24 | 26 | 25 | 24 | 2 | 5 | 29 | 17 | 34 |
| Whimbrel† | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 |

SPA qualifying species highlighted in bold. † Species with this symbol are included as named components of the SPA waterfowl assemblage.

| | |
|---|---|
| (green) | Cells highlighted green indicate the count is of local importance (> 1%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that for the Common Sandpiper, Mediterranean Gull, and Whimbrel the local importance threshold is < 1. |
| (orange) | Cells highlighted orange indicate the count is of regional importance (> 10%) of the current estuary wide WeBS 5-year mean peak (2017/18 to 2021/22). It should be noted that the regional importance threshold for the Mediterranean Gull was <1. |
| (blue) | Cells highlighted blue indicate the count is of national importance. It should be noted that for Avocet, Black-tailed Godwit, Common Sandpiper and Whimbrel, the regional importance threshold (> 10% of the estuary wide WeBS 5-year mean peak (565, 4, and 6 birds respectively) is higher than the national importance threshold which is currently set at 390 individuals for the Black-tailed Godwit and 1 individual for both the Common Sandpiper and Whimbrel. |
| (red) | Cells highlighted red indicate the count is of international importance. |

# Appendix B: SPA Assemblage Species Screening Rationale

# Immingham Green Energy Terminal

Shadow Habitats Regulations Assessment: Appendix B

Associated British Ports

July 2024

# SPA Assemblage Features Screening Summary

This appendix provides a summary on the rationale for screening in SPA assemblage species as part of Stage 1 (Screening) of the Shadow HRA (Section 3). The species list provided in the '*Annex B: Humber Estuary Special Protection Area: non-breeding waterbird assemblage (Version 1.2, June 2023)'* note provided by Natural England has been used in Table B-1.

**Table B-1. Humber Estuary SPA Assemblage Species**

| SPA Assemblage Feature | Signpost to Shadow HRA |
|---|---|
| ***Species listed individually under the assemblage feature on the SPA citation*** | |
| Avocet*, Recurvirostra avosetta* (non-breeding) | This species is recorded in the Immingham region but is considered rare in the vicinity of the Project with no Avocet recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). This species has been screened out of the IGET Shadow Habitats Regulations Assessment (Shadow HRA) due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |
| Bar-tailed Godwit, *Limosa lapponica* (non-breeding) | Very low numbers (< 5 individuals, representing < 1 % of the estuary wide WeBS 5-year mean peak) have been recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A of the Shadow HRA). The area is, therefore, considered to be of very limited functional value for the qualifying species and has been screened out (see Table 2 of the Shadow HRA for further detail). |
| Bittern, *Botaurus stellaris* (non-breeding) | This species does not normally occur on open mudflat habitat and has not been recorded in the IOH bird monitoring that has been undertaken in the Immingham area. This species has been screened out of the Shadow HRA due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |
| Black-tailed Godwit, *Limosa limosa islandica* (non-breeding | Black-tailed Godwit have been regularly observed on the foreshore in the area of the Project with abundances < 100 individuals recorded (representing up to 2 % of the estuary wide WeBS 5-year mean peak) in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A of the Shadow HRA). This qualifying species has been screened into and assessed within the Shadow HRA. |
| Brent Goose, *Branta bernicla* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (see Section 1.4 of Appendix A of this Shadow HRA). |

| SPA Assemblage Feature | Signpost to Shadow HRA |
|---|---|
| Curlew, *Numenius arquata* (non-breeding) | The numbers of Curlew recorded on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A) are lower than 1% of the estuary wide population (based on the WeBS 5-year mean peak). However, this species has been screened into and assessed as part of the waterbird assemblage within the Shadow HRA on a precautionary basis as this species is regularly recorded on the foreshore. |
| Dunlin, *Calidris alpina alpina* (non-breeding) | Low numbers (<100 individuals, representing < 1 % of the estuary wide WeBS 5-year mean peak) have been regularly recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A). While this qualifying species has only been recorded in low numbers in the context of estuary-wide populations, given this species is regularly recorded, the feature has been screened in on a precautionary basis (see Table 2 of the Shadow HRA for further detail). |
| Golden Plover, *Pluvialis apricaria* (non-breeding) | The species is considered rare in the vicinity of the Project with no Golden Plover recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). This species has been screened out of the Shadow HRA due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |
| Goldeneye, *Bucephala clangula* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) or in nearby offshore waters in the Port of Immingham area for the last five years during the IOH monitoring. |
| Greenshank, *Tringa Nebularia* (non-breeding) | This species was not specifically considered within the Shadow HRA as this species is considered rare in the vicinity of the Project with no Greenshank recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |
| Grey Plover, *Pluvialis squatarola* (non-breeding) | This species was not specifically considered within the Shadow HRA as Grey Plover are typically only recorded very infrequently and in low numbers (representing <1 % of the estuary wide WeBS 5-year mean peak)) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |
| Knot, *Calidris canutus* (non-breeding) | While this species is recorded on the foreshore in the Immingham area, the species is considered rare in the vicinity of the Project with no Knot recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). The area is, therefore, considered to be of very limited functional value for the species and has been screened out (see Table 2 of the Shadow HRA for further detail). |

| SPA Assemblage Feature | Signpost to Shadow HRA |
|---|---|
| Lapwing, *Vanellus vanellus* (non-breeding) | This species was not specifically considered within the Shadow HRA as Lapwing are only recorded very infrequently and in low numbers (representing <1 % of the estuary wide WeBS 5-year mean peak) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |
| Mallard, *Anas platyrhynchos* (non-breeding | This species was not specifically considered within the Shadow HRA as Mallard are typically only recorded very infrequently and in low numbers (representing <1 % of the estuary wide WeBS 5-year mean peak) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |
| Oystercatcher, *Haematopus ostralegus* (non-breeding) | The numbers of Oystercatcher on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A) are lower than 1% of the estuary wide population (based on the WeBS 5-year mean peak). However, this species has been screened into and assessed as part of the waterbird assemblage within the within the Shadow HRA on a precautionary basis as this species is regularly recorded on the foreshore. |
| Pochard, *Aythya farina* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) or in nearby offshore waters in the Port of Immingham area for the last five years during the IOH monitoring. |
| Redshank, *Tringa totanus* (non-breeding | Low numbers (<10-20 individuals, representing < 1 % of the estuary wide WeBS 5-year mean peak) have been regularly recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A). While this qualifying species has only been recorded in low numbers in the context of estuary-wide populations, given this species is regularly recorded, the feature has been screened in on a precautionary basis. |
| Ringed Plover, *Charadrius hiaticula* (non-breeding) | This species was not specifically considered within the Shadow HRA as Ringed Plover are typically only recorded very infrequently and in low numbers (representing <1 % of the estuary wide WeBS 5-year mean peak) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |
| Ruff, *Philomachus pugnax* (non-breeding) | This species is rarely recorded on mudflat habitat in the Immingham area with no records of the species occurring in Sector C over the last five years of IOH monitoring (2018/19 to 2022/23). This species has been screened out of the Shadow HRA due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |
| Sanderling, *Calidris alba* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) for the last five years (see Section 1.4 of Appendix A of this Shadow HRA). |

| SPA Assemblage Feature | Signpost to Shadow HRA |
|---|---|
| Scaup, *Aythya marila* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) or in nearby offshore waters in the Port of Immingham area for the last five years during the IOH monitoring. |
| Shelduck, *Tadorna tadorna* (non-breeding) | Low numbers (< 10-20 individuals, representing < 1 % of the estuary wide WeBS 5-year mean peak) have been recorded in the last 5-years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C between the Immingham Oil Terminal ("IOT") Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A). While this qualifying species has only been recorded in relatively low numbers in the context of estuary-wide populations, given this species is regularly recorded, the feature has been screened in into and assessed within the Shadow HRA on a precautionary basis. |
| Teal, *Anas crecca* (non-breeding) | The numbers of Teal on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project) (Section 1.4 of Appendix A) are lower than 1% of the estuary wide population (based on the WeBS 5-year mean peak). However, this species has been screened into and assessed as part of the waterbird assemblage within the within the Shadow HRA on a precautionary basis as this species is regularly recorded on the foreshore. |
| Turnstone, *Arenaria interpres* (non-breeding) | Turnstone have been recorded on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project in abundances representing up to 10% of the estuary wide population (based on the WeBS 5-year mean peak)). This species has been screened into and assessed as part of the waterbird assemblage within the Shadow HRA. |
| Whimbrel, *Numenius phaeopus* (non-breeding) | This species was not specifically considered within the Shadow HRA as Whimbrel are typically only recorded rarely and in very low numbers (representing <1 % of the estuary wide WeBS 5-year mean peak) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |
| Wigeon, *Anas Penelope (*non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) for the last five years (see Section 1.4 of Appendix A of this Shadow HRA). |
| *Species which are not listed on the SPA citation but occur at site levels of more than 1% of the national population according to the most recent Humber Estuary Wetland Bird Survey (WeBS) 5-year average count* | |
| Green Sandpiper, *Tringa ochropus* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) for the last five years (see Section 1.4 of Appendix A of this Shadow HRA). |
| Greylag Goose, *Anser anser* (non-breeding) | This species was not specifically considered within the Shadow HRA as Greylag Goose, are typically only recorded very infrequently and in low numbers (representing <1 % of the estuary wide WeBS 5-year mean peak) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |

| SPA Assemblage Feature | Signpost to Shadow HRA |
|---|---|
| Little Egret, *Egretta garzetta* (non-breeding) | This species was not specifically considered within the Shadow HRA as Little Egret are typically only recorded infrequently and in low numbers (representing <1 % of the estuary wide WeBS 5-year mean peak) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500 m of the Project). |
| Pink-footed Goose, *Anser brachyrhynchus* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) for the last five years (see Section 1.4 of Appendix A of this Shadow HRA). |
| Shoveler, *Anas clypeata* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) for the last five years (see Section 1.4 of Appendix A of this Shadow HRA). |
| Crane, *Grus grus* (non-breeding) | This species was not specifically considered within the Shadow HRA as it has not been recorded within the bird count sector adjacent to the proposed works (IOH Sector C) for the last five years (see Section 1.4 of Appendix A of this Shadow HRA). |
| *Non-breeding waterbirds but are listed on the citation qualifying under article 4.1 and 4.2 of the Directive* | |
| Hen Harrier, *Circus cyaneus* (non-breeding) | This species has been screened out of the Shadow HRA due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |
| Marsh Harrier, *Circus aeruginosus* (breeding) | This species has been screened out of the Shadow HRA due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |
| Little Tern, *Sterna albifrons* (breeding) | Little Tern breed at Easington Lagoon, which is located approximately 20 km from the proposed development, with data suggesting this species forages within 5 km of nesting sites. This species is considered very rare within the Immingham area and has been screened out of the Shadow HRA due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |
| Avocet, *Recurvirostra avosetta* (breeding) | This species has been screened out of the Shadow HRA due to the lack of a viable impact pathway (see Table 2 of the Shadow HRA for further detail). |

# Appendix C: European/Ramsar Designated Sites Citations

I

# Immingham Green Energy Terminal

## Shadow Habitats Regulations Assessment: Appendix C

Associated British Ports

July 2024

# STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 (2011/484/EU).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the SPA homepage and SAC homepage on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

https://jncc.gov.uk/

# NATURA 2000 - STANDARD DATA FORM

**For Special Protection Areas (SPA),**
**Proposed Sites for Community Importance (pSCI),**
**Sites of Community Importance (SCI) and**
**for Special Areas of Conservation (SAC)**

| | |
|---|---|
| SITE | **UK0030170** |
| SITENAME | **Humber Estuary** |

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## 1. SITE IDENTIFICATION

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| 1.1 Type | 1.2 Site code |
|---|---|
| B | UK0030170 |

### 1.3 Site name

| |
|---|
| Humber Estuary |

| 1.4 First Compilation date | 1.5 Update date |
|---|---|
| 2007-08 | 2015-12 |

### 1.6 Respondent:

| | |
|---|---|
| **Name/Organisation:** | Joint Nature Conservation Committee |
| **Address:** | Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY |
| **Email:** | |

| | |
|---|---|
| **Date site proposed as SCI:** | 2007-08 |
| **Date site confirmed as SCI:** | 2008-12 |
| **Date site designated as SAC:** | 2009-12 |
| **National legal reference of SAC designation:** | Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made). |

## 2. SITE LOCATION

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### 2.1 Site-centre location [decimal degrees]:

| Longitude | Latitude |
|---|---|
| -0.734722222 | 53.58916667 |

**2.2 Area [ha]:**

36657.15

**2.3 Marine area [%]**

91.6

**2.4 Sitelength [km]:**

0.0

### 2.5 Administrative region code and name

| NUTS level 2 code | Region Name |
|---|---|
| UKE1 | East Yorkshire and Northern Lincolnshire |
| UKF3 | Lincolnshire |
| UKZZ | Extra-Regio |

### 2.6 Biogeographical Region(s)

Atlantic (100.0 %)

## 3. ECOLOGICAL INFORMATION

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### 3.1 Habitat types present on the site and assessment for them

| Annex I Habitat types | | | | | | Site assessment | | | |
|---|---|---|---|---|---|---|---|---|---|
| Code | PF | NP | Cover [ha] | Cave [number] | Data quality | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Representativity | Relative Surface | Conservation | Global |
| 1110 | | | 1656.9 | 0 | P | C | A | C | C |
| 1130 | | | 36657.15 | 0 | G | B | B | B | B |
| 1140 | | | 9384.23 | 0 | G | B | B | B | B |
| 1150 | X | | 7.33 | 0 | G | C | C | B | C |
| 1210 | | | | 0 | | D | | | |
| 1310 | | | 47.65 | 0 | P | C | C | B | C |
| 1320 | | | 135.63 | 0 | G | D | | | |
| 1330 | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 784.46 | 0 | G | C | B | C | C |
| 2110 | | | 18.33 | 0 | G | C | A | C | C |
| 2120 | | | 14.66 | 0 | G | C | B | C | C |
| 2130 | X | | 14.66 | 0 | G | C | C | C | C |
| 2160 | | | 65.98 | 0 | G | C | B | C | C |

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

### 3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

| Species | | | | | Population in the site | | | | | | Site assessment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | Code | Scientific Name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. | Glo. |
| F | 1102 | Alosa alosa | | | p | | | | P | DD | D | | | |
| F | 1103 | Alosa fallax | | | p | | | | P | DD | D | | | |
| M | 1364 | Halichoerus grypus | | | p | 1800 | 1800 | i | | G | C | B | B | C |
| F | 1099 | Lampetra fluviatilis | | | p | | | | P | DD | A | B | C | C |
| F | 1095 | Petromyzon marinus | | | p | 251 | 500 | i | | M | B | C | C | C |
| M | 1365 | Phoca vitulina | | | p | | | | P | DD | D | | | |

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

# 4. SITE DESCRIPTION

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## 4.1 General site character

| Habitat class | % Cover |
|---|---|
| N03 | 4.4 |
| N07 | 0.4 |
| N04 | 0.4 |
| N02 | 94.9 |
| **Total Habitat Cover** | 100.10000000000002 |

**Other Site Characteristics**

1 Terrestrial: Soil & Geology: shingle,sedimentary,sandstone,neutral,mud,sand,alluvium,clay 2 Terrestrial: Geomorphology and landscape: coastal,floodplain,lowland 3 Marine: Geology: gravel,mud,sedimentary,sand,sandstone/mudstone,clay,shingle,limestone/chalk 4 Marine: Geomorphology: shingle bar,lagoon,islands,estuary,subtidal sediments (including sandbank/mudbank),intertidal sediments (including sandflat/mudflat),cliffs

## 4.2 Quality and importance

Sandbanks which are slightly covered by sea water all the time for which the area is considered to support a significant presence. Estuaries for which this is considered to be one of the best areas in the United Kingdom. Mudflats and sandflats not covered by seawater at low tide for which this is considered to be one of the best areas in the United Kingdom. Coastal lagoons for which the area is considered to support a significant presence. Salicornia and other annuals colonising mud and sand for which the area is considered to support a significant presence. Atlantic salt meadows (Glauco-Puccinellietalia maritimae) for which the area is considered to support a significant presence. Embryonic shifting dunes for which the area is considered to support a significant presence. which is considered to be rare as its total extent in the United Kingdom is estimated to be less than 1000 hectares. Shifting dunes along the shoreline with Ammophila arenaria (?white dunes?) for which the area is considered to support a significant presence. Dunes with Hippophae rhamnoides for which the area is considered to support a significant presence. which is considered to be rare as its total extent in the United Kingdom is estimated to be less than 1000 hectares. Fixed dunes with herbaceous vegetation (?grey dunes?) for which the area is considered to support a significant presence. Petromyzon marinus for which the area is considered to support a significant presence. Lampetra fluviatilis for which the area is considered to support a significant presence. Halichoerus grypus for which the area is considered to support a significant presence.

## 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts

| Rank | Threats and pressures [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |
|---|---|---|---|
| H | M01 | | B |
| H | E02 | | O |
| H | J02 | | B |
| H | H02 | | B |
| H | K01 | | I |

Positive Impacts

| Rank | Activities, management [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |
|---|---|---|---|
| H | D05 | | I |
| H | A02 | | I |
| H | B02 | | I |
| H | A04 | | I |

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,
T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

## 4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): http://publications.naturalengland.org.uk/category/6490068894089216

http://publications.naturalengland.org.uk/category/3212324
http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

## 5. SITE PROTECTION STATUS (optional)

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### 5.1 Designation types at national and regional level:

| Code | Cover [%] | Code | Cover [%] | Code | Cover [%] |
|---|---|---|---|---|---|
| UK01 | 1.8 | UK04 | 100.0 | | |

## 6. SITE MANAGEMENT

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### 6.1 Body(ies) responsible for the site management:

| | |
|---|---|
| Organisation: | Natural England |
| Address: | |
| Email: | |

### 6.2 Management Plan(s):

An actual management plan does exist:

- [ ] Yes
- [ ] No, but in preparation
- [x] No

### 6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

# EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the official European Union guidelines for the Standard Data Form (also referencing the relevant page number).

1.1 Site type

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | SPA (classified Special Protection Area) | 53 |
| B | cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation) | 53 |
| C | SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar) | 53 |

3.1 Habitat code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| 1110 | Sandbanks which are slightly covered by sea water all the time | 57 |
| 1130 | Estuaries | 57 |
| 1140 | Mudflats and sandflats not covered by seawater at low tide | 57 |
| 1150 | Coastal lagoons | 57 |
| 1160 | Large shallow inlets and bays | 57 |
| 1170 | Reefs | 57 |
| 1180 | Submarine structures made by leaking gases | 57 |
| 1210 | Annual vegetation of drift lines | 57 |
| 1220 | Perennial vegetation of stony banks | 57 |
| 1230 | Vegetated sea cliffs of the Atlantic and Baltic Coasts | 57 |
| 1310 | Salicornia and other annuals colonizing mud and sand | 57 |
| 1320 | Spartina swards (Spartinion maritimae) | 57 |
| 1330 | Atlantic salt meadows (Glauco-Puccinellietalia maritimae) | 57 |
| 1340 | Inland salt meadows | 57 |
| 1420 | Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi) | 57 |
| 2110 | Embryonic shifting dunes | 57 |
| 2120 | Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") | 57 |
| 2130 | Fixed coastal dunes with herbaceous vegetation ("grey dunes") | 57 |
| 2140 | Decalcified fixed dunes with Empetrum nigrum | 57 |
| 2150 | Atlantic decalcified fixed dunes (Calluno-Ulicetea) | 57 |
| 2160 | Dunes with Hippopha• rhamnoides | 57 |
| 2170 | Dunes with Salix repens ssp. argentea (Salicion arenariae) | 57 |
| 2190 | Humid dune slacks | 57 |
| 21A0 | Machairs (* in Ireland) | 57 |
| 2250 | Coastal dunes with Juniperus spp. | 57 |
| 2330 | Inland dunes with open Corynephorus and Agrostis grasslands | 57 |
| 3110 | Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) | 57 |
| 3130 | Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea | 57 |
| 3140 | Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. | 57 |
| 3150 | Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation | 57 |

3.1 Habitat representativity (abbreviated to ‘Representativity’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent representatively | 57 |
| B | Good representatively | 57 |
| C | Significant representatively | 57 |
| D | Non-significant presence representatively | 57 |

3.1 Relative surface

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 58 |
| B | > 2%-15% | 58 |
| C | ≤ 2% | 58 |

3.1 Degree of conservation (abbreviated to ‘Conservation’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent conservation | 59 |
| B | Good conservation | 59 |
| C | Average or reduced conservation | 59 |

3.1 Global assessment (abbreviated to ‘Global’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent value | 59 |
| B | Good value | 59 |
| C | Significant value | 59 |

3.2 Population (abbreviated to ‘Pop.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 62 |
| B | > 2%-15% | 62 |
| C | ≤ 2% | 62 |
| D | Non-significant population | 62 |

3.2 Degree of conservation (abbreviated to ‘Con.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent conservation | 63 |
| B | Good conservation | 63 |
| C | Average or reduced conservation | 63 |

3.2 Isolation (abbreviated to ‘Iso.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Population (almost) Isolated | 63 |
| B | Population not-isolated, but on margins of area of distribution | 63 |
| C | Population not-isolated within extended distribution range | 63 |

3.2 Global Grade (abbreviated to ‘Glo.’ or ‘G.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent value | 63 |
| B | Good value | 63 |
| C | Significant value | 63 |

3.3 Other species – essentially covers bird assemblage types

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| WATR | Non-breeding waterbird assemblage | UK specific code |
| SBA | Breeding seabird assemblage | UK specific code |

| | | |
|---|---|---|
| BBA | Breeding bird assemblage (applies only to sites classified pre 2000) | UK specific code |

## 4.1 Habitat class code



## 4.3 Threats code

## 5.1 Designation type codes

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| UK00 | No Protection Status | 67 |
| UK01 | National Nature Reserve | 67 |
| UK04 | Site of Special Scientific Interest (GB) | 67 |
| UK05 | Marine Conservation Zone | 67 |
| UK06 | Nature Conservation Marine Protected Area | 67 |
| UK86 | Special Area (Channel Islands) | 67 |
| UK98 | Area of Special Scientific Interest (NI) | 67 |
| IN00 | Ramsar Convention site | 67 |
| IN08 | Special Protection Area | 67 |
| IN09 | Special Area of Conservation | 67 |

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# NATURA 2000 - STANDARD DATA FORM

**For Special Protection Areas (SPA),**
**Proposed Sites for Community Importance (pSCI),**
**Sites of Community Importance (SCI) and**
**for Special Areas of Conservation (SAC)**

SITE **UK9006111**

SITENAME **Humber Estuary**

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## 1. SITE IDENTIFICATION

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| 1.1 Type | 1.2 Site code |
|---|---|
| A | UK9006111 |

### 1.3 Site name

Humber Estuary

| 1.4 First Compilation date | 1.5 Update date |
|---|---|
| 2007-08 | 2015-12 |

### 1.6 Respondent:

| | |
|---|---|
| **Name/Organisation:** | Joint Nature Conservation Committee |
| **Address:** | Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY |
| **Email:** | |

### 1.7 Site indication and designation / classification dates

| | |
|---|---|
| **Date site classified as SPA:** | 2007-08 |
| **National legal reference of SPA designation** | Regulations 12A and 13-15 of the Conservation Habitats and Species Regulations 2010, (http://www.legislation.gov.uk/uksi/2010/490/contents/made) as amended by The Conservation of Habitats and Species (Amendment) Regulations 2011 (http://www.legislation.gov.uk/uksi/2011/625/contents/made). |

## 2. SITE LOCATION

### 2.1 Site-centre location [decimal degrees]:

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| Longitude | Latitude |
|---|---|
| 0.0569 | 53.5497 |

**2.2 Area [ha]:**

37630.24

**2.3 Marine area [%]**

89.5

**2.4 Sitelength [km]:**

0.0

### 2.5 Administrative region code and name

| NUTS level 2 code | Region Name |
|---|---|
| UKZZ | Extra-Regio |
| UKF3 | Lincolnshire |
| UKE1 | East Yorkshire and Northern Lincolnshire |

### 2.6 Biogeographical Region(s)

Atlantic (100.0 %)

## 3. ECOLOGICAL INFORMATION

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### 3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

| Species | | | | | Population in the site | | | | | | Site assessment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | Code | Scientific Name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. |
| B | A052 | Anas crecca | | | w | 2322 | 2322 | i | | G | C | | C |
| B | A050 | Anas penelope | | | w | 5044 | 5044 | i | | G | C | | C |
| B | A053 | Anas platyrhynchos | | | w | 2456 | 2456 | i | | G | C | | C |
| B | A169 | Arenaria interpres | | | w | 629 | 629 | i | | G | C | | C |
| B | A059 | Aythya ferina | | | w | 719 | 719 | i | | G | C | | C |
| B | A062 | Aythya marila | | | w | 127 | 127 | i | | G | C | | C |
| B | A021 | Botaurus stellaris | | | r | 2 | 2 | cmales | P | G | B | | C |
| B | A021 | Botaurus stellaris | | | w | 4 | 4 | i | | G | B | | C |
| | | Branta | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | A675 | bernicla bernicla | | | w | 2098 | 2098 | i | | G | C | | C |
| B | A067 | Bucephala clangula | | | w | 467 | 467 | i | | G | B | | C |
| B | A144 | Calidris alba | | | c | 818 | 818 | i | | G | B | | C |
| B | A144 | Calidris alba | | | w | 486 | 486 | i | | G | B | | C |
| B | A672 | Calidris alpina alpina | | | c | 20269 | 20269 | i | | G | B | | C |
| B | A672 | Calidris alpina alpina | | | w | 22222 | 22222 | i | | G | B | | C |
| B | A143 | Calidris canutus | | | w | 28165 | 28165 | i | | G | B | | C |
| B | A143 | Calidris canutus | | | c | 18500 | 18500 | i | | G | B | | C |
| B | A137 | Charadrius hiaticula | | | c | 1766 | 1766 | i | | G | C | | C |
| B | A137 | Charadrius hiaticula | | | w | 403 | 403 | i | | G | C | | C |
| B | A081 | Circus aeruginosus | | | r | 10 | 10 | bfemales | P | G | B | | B |
| B | A082 | Circus cyaneus | | | w | 8 | 8 | i | | G | C | | C |
| B | A130 | Haematopus ostralegus | | | w | 3503 | 3503 | i | | G | C | | C |
| B | A157 | Limosa lapponica | | | w | 2752 | 2752 | i | | G | B | | C |
| B | A616 | Limosa limosa islandica | | | w | 1113 | 1113 | i | | G | B | | C |
| B | A616 | Limosa limosa islandica | | | c | 915 | 915 | i | | G | B | | C |
| B | A160 | Numenius arquata | | | w | 3253 | 3253 | i | | G | C | | C |
| B | A158 | Numenius phaeopus | | | c | 113 | 113 | i | | G | C | | C |
| B | A151 | Philomachus pugnax | | | c | 128 | 128 | i | | G | C | | C |
| B | A140 | Pluvialis apricaria | | | w | 30709 | 30709 | i | | G | B | | C |
| B | A141 | Pluvialis squatarola | | | w | 1704 | 1704 | i | | G | B | | C |
| B | A141 | Pluvialis squatarola | | | c | 1590 | 1590 | i | | G | B | | C |
| B | A132 | Recurvirostra avosetta | | | w | 59 | 59 | i | | G | C | | B |
| B | A132 | Recurvirostra avosetta | | | r | 64 | 64 | p | | G | C | | B |
| B | A195 | Sterna albifrons | | | r | 51 | 51 | p | | G | B | | C |
| | | Tadorna | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | A048 | tadorna | | | w | 4464 | 4464 | i | | G | B | | C |
| B | A164 | Tringa nebularia | | | c | 77 | 77 | i | | G | C | | C |
| B | A162 | Tringa totanus | | | w | 4632 | 4632 | i | | G | B | | C |
| B | A162 | Tringa totanus | | | c | 7462 | 7462 | i | | G | B | | C |
| B | A142 | Vanellus vanellus | | | w | 22765 | 22765 | i | | G | C | | C |

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

### 3.3 Other important species of flora and fauna (optional)

| Species | | | | | Population in the site | | | | Motivation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | CODE | Scientific Name | S | NP | Size | | Unit | Cat. | Species Annex | | Other categories | | | |
| | | | | | Min | Max | | C\|R\|V\|P | IV | V | A | B | C | D |
| B | WATR | Waterbird assemblage | | | 153934 | 153934 | i | | | | | | X | |

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see reference portal)
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories: IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

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### 4.1 General site character

| Habitat class | % Cover |
|---|---|
| N06 | 0.6 |
| N03 | 4.6 |

| | |
|---|---|
| N04 | 0.8 |
| N02 | 93.6 |
| N07 | 0.3 |
| **Total Habitat Cover** | 99.89999999999998 |

**Other Site Characteristics**

1 Terrestrial: Soil & Geology: mud,shingle,alluvium,sandstone,sand,neutral,clay,limestone,sedimentary,sandstone,shingle,sand,neut Terrestrial: Geomorphology and landscape: lowland,floodplain,coastal,lowland,floodplain,coastal 3 Marine: Geology: sand,gravel,mud,sedimentary,clay,sandstone/mudstone,shingle,limestone/chalk,clay,sedimentary,sanc Marine: Geomorphology: shingle bar,islands,intertidal sediments (including sandflat/mudflat),cliffs,estuary,intertidal sediments (including sandflat/mudflat),islands,lagoon,estuary,subtidal sediments (including sandbank/mudbank),shingle bar,cliffs

### 4.2 Quality and importance

ARTICLE 4.1 QUALIFICATION (79/409/EEC) During the breeding season the area regularly supports: Botaurus stellaris (Europe - breeding) 10.5% of the population in Great Britain 2000-2002 Circus aeruginosus 6.3% of the population in Great Britain 1998-2002 Recurvirostra avosetta (Western Europe/Western Mediterranean - breeding) 8.6% of the population in Great Britain 1998-2002 Sterna albifrons (Eastern Atlantic - breeding) 2.1% of the population in Great Britain 1998-2002 Over winter the area regularly supports: Botaurus stellaris (Europe - breeding) 4% of the population in Great Britain 1998/9 to 2002/3 Circus cyaneus 1.1% of the population in Great Britain 1997/8 to 2001/2 Limosa lapponica (Western Palearctic - wintering) 4.4% of the population in Great Britain 1996/7 to 2000/1 Pluvialis apricaria [North-western Europe - breeding] 12.3% of the population in Great Britain 1996/7 to 2000/1 Recurvirostra avosetta (Western Europe/Western Mediterranean - breeding) 1.7% of the population in Great Britain 1996/7 to 2000/1 On passage the area regularly supports: Philomachus pugnax (Western Africa - wintering) 1.4% of the population in Great Britain 1996-2000 ARTICLE 4.2 QUALIFICATION (79/409/EEC) Over winter the area regularly supports: Calidris alpina alpina (Northern Siberia/Europe/Western Africa) 1.7% of the population 1996/7 to 2000/1 Calidris canutus (North-eastern Canada/Greenland/Iceland/North-western Europe) 6.3% of the population 1996/7 to 2000/1 Limosa limosa islandica (Iceland - breeding) 3.2% of the population 1996/7 to 2000/1 Tadorna tadorna (North-western Europe) 1.5% of the population 1996/7 to 2000/1 Tringa totanus (Eastern Atlantic - wintering) 3.6% of the population 1996/7 to 2000/1 On passage the area regularly supports: Calidris alpina alpina (Northern Siberia/Europe/Western Africa) 1.5% of the population 1996-2000 Calidris canutus (North-eastern Canada/Greenland/Iceland/North-western Europe) 4.1% of the population 1996-2000 Limosa limosa islandica (Iceland - breeding) 2.6% of the population 1996-2000 Tringa totanus (Eastern Atlantic - wintering) 5.7% of the population 1996-2000 ARTICLE 4.2 QUALIFICATION (79/409/EEC): AN INTERNATIONALLY IMPORTANT ASSEMBLAGE OF BIRDS Over winter the area regularly supports: 153934 waterfowl (5 year peak mean 1991/92-1995/96) Including: Botaurus stellaris , Branta bernicla bernicla , Tadorna tadorna , Anas penelope , Anas crecca , Anas platyrhynchos , Aythya ferina , Aythya marila , Bucephala clangula , Haematopus ostralegus , Recurvirostra avosetta , Charadrius hiaticula , Pluvialis apricaria [North-western Europe - breeding], Pluvialis squatarola , Vanellus vanellus , Calidris canutus , Calidris alba , Calidris alpina alpina , Philomachus pugnax , Limosa limosa islandica , Limosa lapponica , Numenius phaeopus , Numenius arquata , Tringa totanus , Tringa nebularia , Arenaria interpres

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

| Negative Impacts | | | |
|---|---|---|---|
| Rank | Threats and pressures [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |
| H | K01 | | I |
| H | I01 | | B |
| H | G01 | | I |
| H | M02 | | B |
| H | M01 | | B |

| Positive Impacts | | | |
|---|---|---|---|
| Rank | Activities, management [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |
| H | A02 | | I |
| H | D05 | | I |
| H | B02 | | I |
| H | D05 | | I |
| H | A04 | | I |
| H | A03 | | I |

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

### 4.5 Documentation

Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website).

Link(s): http://publications.naturalengland.org.uk/category/6490068894089216

http://publications.naturalengland.org.uk/category/3212324
http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf

## 5. SITE PROTECTION STATUS (optional)

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### 5.1 Designation types at national and regional level:

| Code | Cover [%] | Code | Cover [%] | Code | Cover [%] |
|---|---|---|---|---|---|
| UK04 | 100.0 | | | | |

## 6. SITE MANAGEMENT

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### 6.1 Body(ies) responsible for the site management:

| | |
|---|---|
| Organisation: | Natural England |
| Address: | |
| Email: | |

### 6.2 Management Plan(s):

An actual management plan does exist:

[ ] Yes
[ ] No, but in preparation
[X] No

### 6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

## 7. MAP OF THE SITES

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INSPIRE ID:

Map delivered as PDF in electronic format (optional)

[ ] Yes [X] No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

# EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the official European Union guidelines for the Standard Data Form (also referencing the relevant page number).

1.1 Site type

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | SPA (classified Special Protection Area) | 53 |
| B | cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation) | 53 |
| C | SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar) | 53 |

3.1 Habitat code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| 1110 | Sandbanks which are slightly covered by sea water all the time | 57 |
| 1130 | Estuaries | 57 |
| 1140 | Mudflats and sandflats not covered by seawater at low tide | 57 |
| 1150 | Coastal lagoons | 57 |
| 1160 | Large shallow inlets and bays | 57 |
| 1170 | Reefs | 57 |
| 1180 | Submarine structures made by leaking gases | 57 |
| 1210 | Annual vegetation of drift lines | 57 |
| 1220 | Perennial vegetation of stony banks | 57 |
| 1230 | Vegetated sea cliffs of the Atlantic and Baltic Coasts | 57 |
| 1310 | Salicornia and other annuals colonizing mud and sand | 57 |
| 1320 | Spartina swards (Spartinion maritimae) | 57 |
| 1330 | Atlantic salt meadows (Glauco-Puccinellietalia maritimae) | 57 |
| 1340 | Inland salt meadows | 57 |
| 1420 | Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi) | 57 |
| 2110 | Embryonic shifting dunes | 57 |
| 2120 | Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") | 57 |
| 2130 | Fixed coastal dunes with herbaceous vegetation ("grey dunes") | 57 |
| 2140 | Decalcified fixed dunes with Empetrum nigrum | 57 |
| 2150 | Atlantic decalcified fixed dunes (Calluno-Ulicetea) | 57 |
| 2160 | Dunes with Hippopha• rhamnoides | 57 |
| 2170 | Dunes with Salix repens ssp. argentea (Salicion arenariae) | 57 |
| 2190 | Humid dune slacks | 57 |
| 21A0 | Machairs (* in Ireland) | 57 |
| 2250 | Coastal dunes with Juniperus spp. | 57 |
| 2330 | Inland dunes with open Corynephorus and Agrostis grasslands | 57 |
| 3110 | Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) | 57 |
| 3130 | Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea | 57 |
| 3140 | Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. | 57 |
| 3150 | Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation | 57 |

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| 3160 | Natural dystrophic lakes and ponds | 57 |
| 3170 | Mediterranean temporary ponds | 57 |
| 3180 | Turloughs | 57 |
| 3260 | Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation | 57 |
| 4010 | Northern Atlantic wet heaths with Erica tetralix | 57 |
| 4020 | Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix | 57 |
| 4030 | European dry heaths | 57 |
| 4040 | Dry Atlantic coastal heaths with Erica vagans | 57 |
| 4060 | Alpine and Boreal heaths | 57 |
| 4080 | Sub-Arctic Salix spp. scrub | 57 |
| 5110 | Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.) | 57 |
| 5130 | Juniperus communis formations on heaths or calcareous grasslands | 57 |
| 6130 | Calaminarian grasslands of the Violetalia calaminariae | 57 |
| 6150 | Siliceous alpine and boreal grasslands | 57 |
| 6170 | Alpine and subalpine calcareous grasslands | 57 |
| 6210 | Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) | 57 |
| 6230 | Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe) | 57 |
| 6410 | Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) | 57 |
| 6430 | Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels | 57 |
| 6510 | Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) | 57 |
| 6520 | Mountain hay meadows | 57 |
| 7110 | Active raised bogs | 57 |
| 7120 | Degraded raised bogs still capable of natural regeneration | 57 |
| 7130 | Blanket bogs (* if active bog) | 57 |
| 7140 | Transition mires and quaking bogs | 57 |
| 7150 | Depressions on peat substrates of the Rhynchosporion | 57 |
| 7210 | Calcareous fens with Cladium mariscus and species of the Caricion davallianae | 57 |
| 7220 | Petrifying springs with tufa formation (Cratoneurion) | 57 |
| 7230 | Alkaline fens | 57 |
| 7240 | Alpine pioneer formations of the Caricion bicoloris-atrofuscae | 57 |
| 8110 | Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) | 57 |
| 8120 | Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii) | 57 |
| 8210 | Calcareous rocky slopes with chasmophytic vegetation | 57 |
| 8220 | Siliceous rocky slopes with chasmophytic vegetation | 57 |
| 8240 | Limestone pavements | 57 |
| 8310 | Caves not open to the public | 57 |
| 8330 | Submerged or partially submerged sea caves | 57 |
| 9120 | Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion) | 57 |
| 9130 | Asperulo-Fagetum beech forests | 57 |
| 9160 | Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli | 57 |
| 9180 | Tilio-Acerion forests of slopes, screes and ravines | 57 |
| 9190 | Old acidophilous oak woods with Quercus robur on sandy plains | 57 |
| 91A0 | Old sessile oak woods with Ilex and Blechnum in the British Isles | 57 |
| 91C0 | Caledonian forest | 57 |
| 91D0 | Bog woodland | 57 |
| 91E0 | Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) | 57 |
| 91J0 | Taxus baccata woods of the British Isles | 57 |

3.1 Habitat representativity (abbreviated to ‘Representativity’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent representatively | 57 |
| B | Good representatively | 57 |
| C | Significant representatively | 57 |
| D | Non-significant presence representatively | 57 |

3.1 Relative surface

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 58 |
| B | > 2%-15% | 58 |
| C | ≤ 2% | 58 |

3.1 Degree of conservation (abbreviated to ‘Conservation’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent conservation | 59 |
| B | Good conservation | 59 |
| C | Average or reduced conservation | 59 |

3.1 Global assessment (abbreviated to ‘Global’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent value | 59 |
| B | Good value | 59 |
| C | Significant value | 59 |

3.2 Population (abbreviated to ‘Pop.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 62 |
| B | > 2%-15% | 62 |
| C | ≤ 2% | 62 |
| D | Non-significant population | 62 |

3.2 Degree of conservation (abbreviated to ‘Con.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent conservation | 63 |
| B | Good conservation | 63 |
| C | Average or reduced conservation | 63 |

3.2 Isolation (abbreviated to ‘Iso.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Population (almost) Isolated | 63 |
| B | Population not-isolated, but on margins of area of distribution | 63 |
| C | Population not-isolated within extended distribution range | 63 |

3.2 Global Grade (abbreviated to ‘Glo.’ or ‘G.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent value | 63 |
| B | Good value | 63 |
| C | Significant value | 63 |

3.3 Other species – essentially covers bird assemblage types

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| WATR | Non-breeding waterbird assemblage | UK specific code |
| SBA | Breeding seabird assemblage | UK specific code |

| | | |
|---|---|---|
| BBA | Breeding bird assemblage (applies only to sites classified pre 2000) | UK specific code |

## 4.1 Habitat class code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| N01 | Marine areas, Sea inlets | 65 |
| N02 | Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins) | 65 |
| N03 | Salt marshes, Salt pastures, Salt steppes | 65 |
| N04 | Coastal sand dunes, Sand beaches, Machair | 65 |
| N05 | Shingle, Sea cliffs, Islets | 65 |
| N06 | Inland water bodies (Standing water, Running water) | 65 |
| N07 | Bogs, Marshes, Water fringed vegetation, Fens | 65 |
| N08 | Heath, Scrub, Maquis and Garrigue, Phygrana | 65 |
| N09 | Dry grassland, Steppes | 65 |
| N10 | Humid grassland, Mesophile grassland | 65 |
| N11 | Alpine and sub-Alpine grassland | 65 |
| N14 | Improved grassland | 65 |
| N15 | Other arable land | 65 |
| N16 | Broad-leaved deciduous woodland | 65 |
| N17 | Coniferous woodland | 65 |
| N19 | Mixed woodland | 65 |
| N21 | Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas) | 65 |
| N22 | Inland rocks, Screes, Sands, Permanent Snow and ice | 65 |
| N23 | Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites) | 65 |
| N25 | Grassland and scrub habitats (general) | 65 |
| N26 | Woodland habitats (general) | 65 |

## 4.3 Threats code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A01 | Cultivation | 65 |
| A02 | Modification of cultivation practices | 65 |
| A03 | Mowing / cutting of grassland | 65 |
| A04 | Grazing | 65 |
| A05 | Livestock farming and animal breeding (without grazing) | 65 |
| A06 | Annual and perennial non-timber crops | 65 |
| A07 | Use of biocides, hormones and chemicals | 65 |
| A08 | Fertilisation | 65 |
| A10 | Restructuring agricultural land holding | 65 |
| A11 | Agriculture activities not referred to above | 65 |
| B01 | Forest planting on open ground | 65 |
| B02 | Forest and Plantation management & use | 65 |
| B03 | Forest exploitation without replanting or natural regrowth | 65 |
| B04 | Use of biocides, hormones and chemicals (forestry) | 65 |
| B06 | Grazing in forests/ woodland | 65 |
| B07 | Forestry activities not referred to above | 65 |
| C01 | Mining and quarrying | 65 |
| C02 | Exploration and extraction of oil or gas | 65 |
| C03 | Renewable abiotic energy use | 65 |
| D01 | Roads, paths and railroads | 65 |
| D02 | Utility and service lines | 65 |
| D03 | Shipping lanes, ports, marine constructions | 65 |
| D04 | Airports, flightpaths | 65 |
| D05 | Improved access to site | 65 |
| E01 | Urbanised areas, human habitation | 65 |
| E02 | Industrial or commercial areas | 65 |

## 5.1 Designation type codes

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| UK00 | No Protection Status | 67 |
| UK01 | National Nature Reserve | 67 |
| UK04 | Site of Special Scientific Interest (GB) | 67 |
| UK05 | Marine Conservation Zone | 67 |
| UK06 | Nature Conservation Marine Protected Area | 67 |
| UK86 | Special Area (Channel Islands) | 67 |
| UK98 | Area of Special Scientific Interest (NI) | 67 |
| IN00 | Ramsar Convention site | 67 |
| IN08 | Special Protection Area | 67 |
| IN09 | Special Area of Conservation | 67 |

# Information Sheet on Ramsar Wetlands (RIS)

*Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).*

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

---

**1. Name and address of the compiler of this form:**

FOR OFFICE USE ONLY.

| DD | MM | YY |
|---|---|---|
| | | |

Designation date

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

Site Reference Number


**Joint Nature Conservation Committee**
Monkstone House
City Road
Peterborough
Cambridgeshire PE1 1JY
UK
Telephone/Fax: +44 (0)1733 – 562 626 / +44 (0)1733 – 555 948
Email: RIS@JNCC.gov.uk


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**2. Date this sheet was completed/updated:**

Designated: 31 August 2007

**3. Country:**

**UK (England)**

**4. Name of the Ramsar site:**

**Humber Estuary**

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**5. Designation of new Ramsar site or update of existing site:**

**This RIS is for:** Updated information on an existing Ramsar site

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**6. For RIS updates only, changes to the site since its designation or earlier update:**

**a) Site boundary and area:**

The boundary has been extended

** Important note: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

**b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:**

## 7. Map of site included:

Refer to Annex III of the *Explanatory Notes and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

**a) A map of the site, with clearly delineated boundaries, is included as:**

i) **hard copy** (required for inclusion of site in the Ramsar List): *yes* ✓ -or- *no* □;
ii**) an electronic format** (e.g. a JPEG or ArcView image) Yes
iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** *yes* ✓ -or- *no* □;

**b) Describe briefly the type of boundary delineation applied:**
e.g. the boundary is the same as an existing protected area (nature reserve, national park etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The site boundary is the same as, or falls within, an existing protected area.

For precise boundary details, please refer to paper map provided at designation

## 8. Geographical coordinates (latitude/longitude):

053 32 59 N 000 00 03 E

## 9. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Nearest town/city: Kingston-upon-Hull

The Humber Estuary is located on the boundary between the East Midlands Region and the Yorkshire and the Humber Region, on the east coast of England bordering the North Sea.

**Administrative region:** City of Kingston upon Hull; East Riding of Yorkshire; Humberside; Lincolnshire; North East Lincolnshire; North Lincolnshire

## 10. Elevation (average and/or max. & min.) (metres): 11. Area (hectares): 37987.8

Min. -13
Max. 10
Mean No information available

## 12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The Humber Estuary is the largest macro-tidal estuary on the British North Sea coast. It drains a catchment of some 24,240 square kilometres and is the site of the largest single input of freshwater from Britain into the North Sea. It has the second-highest tidal range in Britain (max 7.4 m) and approximately one-third of the estuary is exposed as mud or sand flats at low tide. The inner estuary supports extensive areas of reedbed with areas of mature and developing saltmarsh backed in places by limited areas of grazing marsh in the middle and outer estuary. On the north Lincolnshire coast the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools. The Estuary regularly supports internationally important numbers of waterfowl in winter and nationally important breeding populations in summer.

## 13. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

**1, 3, 5, 6, 8**

## 14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Ramsar criterion 1

The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.

It is a large macro-tidal coastal plain estuary with high suspended sediment loads, which feed a dynamic and rapidly changing system of accreting and eroding intertidal and subtidal mudflats, sandflats, saltmarsh and reedbeds. Examples of both strandline, foredune, mobile, semi-fixed dunes, fixed dunes and dune grassland occur on both banks of the estuary and along the coast. The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion on the tidal rivers of the Ouse and Trent. Wave exposed sandy shores are found in the outer/open coast areas of the estuary. These change to the more moderately exposed sandy shores and then to sheltered muddy shores within the main body of the estuary and up into the tidal rivers. The lower saltmarsh of the Humber is dominated by common cordgrass *Spartina anglica* and annual glasswort *Salicornia* communities. Low to mid marsh communities are mostly represented by sea aster *Aster tripolium*, common saltmarsh grass *Puccinellia maritima* and sea purslane *Atriplex portulacoides* communities. The upper portion of the saltmarsh community is atypical, dominated by sea couch *Elytrigia atherica* (*Elymus pycnanthus*) saltmarsh community. In the upper reaches of the estuary, the tidal marsh community is dominated by the common reed *Phragmites australis* fen and sea club rush *Bolboschoenus maritimus* swamp with the couch grass *Elytrigia repens (Elymus repens)* saltmarsh community. Within the Humber Estuary Ramsar site there are good examples of four of the five physiographic types of saline lagoon.

Ramsar criterion 3

The Humber Estuary Ramsar site supports a breeding colony of grey seals *Halichoerus grypus* at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast. The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site are the most north-easterly breeding site in Great Britain of the natterjack toad *Bufo calamita*.

Ramsar criterion 5

Assemblages of international importance:

153,934 waterfowl, non-breeding season

(5 year peak mean 1996/97-2000/2001)

Ramsar criterion 6 – species/populations occurring at levels of international importance.

Eurasian golden plover, *Pluvialis apricaria*

*altifrons* subspecies – NW Europe, W Continental Europe, NW Africa population

17,996 individuals, passage, representing an average of 2.2% of the population

(5 year peak mean 1996-2000)

Red knot, *Calidris canutus*

*islandica* subspecies

18,500 individuals, passage, representing an average of 4.1% of the population

(5 year peak mean 1996-2000)

Dunlin, *Calidris alpina*
*alpina* subspecies – Western Europe (non-breeding) population
20,269 individuals, passage, representing an average of 1.5% of the population
(5 year peak mean 1996-2000)

Black-tailed godwit, *Limosa limosa*
*islandica* subspecies
915 individuals, passage, representing and average of 2.6% of the population
(5 year peak mean 1996-2000)

Common redshank, *Tringa totanus*
*brittanica* subspecies
7,462 individuals, passage, representing an average of 5.7% of the population
(5 year peak mean 1996-2000)

Common shelduck, *Tadorna tadorna*
Northwestern Europe (breeding) population
4,464 individuals, wintering, representing an average of 1.5% of the population
(5 year peak mean 1996/7-2000/1)

Eurasian golden plover, *Pluvialis apricaria*
*altifrons* subspecies – NW Europe, W Continental Europe, NW Africa population
30,709 individuals, wintering, representing an average of 3.8% of the population
(5 year peak mean 1996/7-2000/1)

Red knot, *Calidris canutus*
*islandica* subspecies
28,165 individuals, wintering, representing an average of 6.3% of the population
(5 year peak mean 1996/7-2000/1)

Dunlin, *Calidris alpina*
*alpina* subspecies – Western Europe (non-breeding) population
22,222 individuals, wintering, representing an average of 1.7% of the population
(5 year peak mean 1996/7-2000/1)

Black-tailed godwit, *Limosa limosa*
*islandica* subspecies
1,113 individuals, wintering, representing an average of 3.2% of the population
(5 year peak mean 1996/7-2000/1)

Bar-tailed godwit , *Limosa lapponica*
*lapponica* subspecies
2,752 individuals, wintering, representing an average of 2.3% of the population
(5 year peak mean 1996/7-2000/1)

Common redshank, *Tringa totanus brittanica* subspecies
4,632 individuals, wintering, representing an average of 3.6% of the population
(5 year peak mean 1996/7-2000/1)

Ramsar criterion 8

The Humber Estuary acts as an important migration route for both river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* between coastal waters and their spawning areas.

Ramsar criterion 5

**Assemblages of international importance:**

**Species with peak counts in winter:**
153934 waterfowl (5 year peak mean 1998/99-2002/2003)

**Ramsar criterion 6 – species/populations occurring at levels of international importance.**

**Qualifying Species/populations (as identified at designation):**
**Species with peak counts in spring/autumn:**

| | |
|---|---|
| European golden plover , *Pluvialis apricaria apricaria*, P. a. altifrons Iceland & Faroes/E Atlantic | 17996 individuals, representing an average of 2.2% of the population (1996-2000) |
| Red knot , *Calidris canutus islandica*, W & Southern Africa | 18500 individuals, representing an average of 4.1% of the population (1996-2000) |
| (wintering) | |
| Dunlin , *Calidris alpina alpina*, W Siberia/W Europe | 20269 individuals, representing an average of 1.5% of the population (1996-2000) |
| Black-tailed godwit , *Limosa limosa islandica*, Iceland/W Europe | 915 individuals, representing an average of 2.6% of the population (1996-2000) |
| Common redshank , *Tringa totanus totanus*, | 7462 individuals, representing an average of 5.7% of the population (1996-2000) |

**Species with peak counts in winter:**

| | |
|---|---|
| Common shelduck , *Tadorna tadorna*, NW Europe | 4464 individuals, representing an average of 1.5% of the population (1996/7 to 2000/1) |
| European golden plover , *Pluvialis apricaria apricaria*, P. a. altifrons Iceland & Faroes/E Atlantic | 30709 individuals, representing an average of 3.8% of the population (1996/7 to 2000/1) |
| Red knot , *Calidris canutus islandica*, W & Southern Africa | 28165 individuals, representing an average of 6.3% of the population (1996/7 to 2000/1) |
| (wintering) | |
| Dunlin , *Calidris alpina alpina*, W Siberia/W Europe | 22222 individuals, representing an average of 1.7% of the population (1996/7 to 2000/1) |

| | |
|---|---|
| Black-tailed godwit , *Limosa limosa islandica*, Iceland/W Europe | 1113 individuals, representing an average of 3.2% of the population (1996/7 to 2000/1) |
| Bar-tailed godwit , *Limosa lapponica lapponica*, W Palearctic | 2752 individuals, representing an average of 2.3% of the population (1996/7 to 2000/1) |

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm.
See Sections 21/22 for details of noteworthy species
Details of bird species occuring at levels of National importance are given in Section 22

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## 15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

**a) biogeographic region:**
Atlantic

**b) biogeographic regionalisation scheme** (include reference citation):
Council Directive 92/43/EEC

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## 16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

| | |
|---|---|
| Soil & geology | neutral, shingle, sand, mud, clay, alluvium, sedimentary, sandstone, sandstone/mudstone, limestone/chalk, gravel, nutrient-rich |
| Geomorphology and landscape | lowland, coastal, floodplain, shingle bar, intertidal sediments (including sandflat/mudflat), estuary, islands, cliffs |
| Nutrient status | eutrophic |
| pH | circumneutral |
| Salinity | brackish / mixosaline, fresh, saline / euhaline |
| Soil | mainly mineral |
| Water permanence | usually permanent |
| Summary of main climatic features | Annual averages (Cleethorpes, 1971–2000) (www.metoffice.com/climate/uk/averages/19712000/sites/cleethorpes.html)<br>Max. daily temperature: 13.1° C<br>Min. daily temperature: 6.4° C<br>Days of air frost: 29.0<br>Rainfall: 565.4 mm<br>Hrs. of sunshine: 1521.9 |

**General description of the Physical Features:**

The Humber estuary is approximately 70 km long from the limit of saline intrusion on the River Ouse at Boothferry to the estuary mouth at Spurn Head, where it enters the North Sea. The area of the estuary is approx. 365 km2, and it has a width of 6.6 km at the mouth.

The Humber is a macro-tidal estuary with a tidal range of 7.4 m, the second-largest range in the UK and comparable to other macro-tidal estuaries worldwide. It is a shallow and well mixed estuary, with an average depth of 6.5m rising to 13.2 m at the mouth.

The Humber is the second-largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. Suspended sediment concentrations are high, and are derived from a variety of sources, including marine sediments and eroding boulder clay along the Holderness coast. This is the northernmost of the English east coast estuaries whose structure and function is intimately linked with soft eroding shorelines.

Upstream from the Humber Bridge, the navigation channel undergoes major shifts from north to south banks. This section of the estuary is noteworthy for extensive mud and sand bars, which in places form semi-permanent islands.

The estuary covers the full salinity range from fully marine at the mouth of the estuary (Spurn Head) to the limit of saline intrusion on the Rivers Ouse and Trent) ). A salinity gradient from north to south bank is observed in the outer estuary, due to the incoming tide flowing along the north bank, while the fresh water keeps to the south bank as it discharges to the sea. As salinity declines upstream, reedbeds and brackish saltmarsh communities fringe the estuary..

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## 17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

The Humber catchment covers an area of ca. 24,240 km2, more than 20% of the land area of England. Average annual precipitation in the upland areas of the catchment is as much as 1000 mm. Average freshwater flow into the Humber estuary from the rivers is 250 m3s-1, ranging from 60 m3s-1 in drier periods to 450 m3s-1 in wet periods. Peak flows of up to 1500 m3s-1 have been recorded during floods. The rivers Trent and Ouse, which provide the main fresh water flow into the Humber, drain large industrial and urban areas to the south and west (River Trent), and less densely populated agricultural areas to the north and west (River Ouse). The Trent/Ouse confluence is known as Trent Falls.

On the north bank of the Humber estuary the principal river is the river Hull, which flows through the city of Kingston-upon-Hull, and has a tidal length of 32 km, up to the Hempholme Weir. The Hull provides only about 1% of the freshwater input to the estuary. On the south bank, the River Ancholme enters the Humber at South Ferriby, but the tide is excluded by a sluice and a tidal lock. Altogether, the total tidal length of rivers and estuary is 313 km.

There are several major urban centres within the river catchments. Nottingham, Leicester, and the West Midlands/Birmingham conurbation are drained by the Trent, the Leeds-Bradford area in West Yorkshire is drained by the Aire/Calder and the Sheffield/Rotherham/Doncaster area in South Yorkshire is drained by the Don. There are also large rural regions, whose populations are currently experiencing high population growth, while the urban areas are showing a small decline. The 1992 population for the Ouse catchment was 4.1 million, and for the Trent catchment was 7.1 million. The population of Humberside, which comprises North and North-east Lincolnshire, the East Riding of Yorkshire, and Kingston-upon-Hull (Hull), was just under 0.9 million. Land use around the estuary itself is 50-98% agricultural, within only two areas of high population/ industry – the major conurbation around Kingston-upon-Hull (Hull) on the north bank, and several large industrial areas around Grimsby/ Immingham/ Cleesthorpes on the south bank.

The area around the Humber estuary is low-lying, and much land-claim of wetlands and supratidal zones, as well as parts of the intertidal zone, was carried out in the past two centuries. The mid to outer estuary (Humber Bridge to Spurn Point) changed from a region of low water erosion in the 19th century to one of accretion in the 20th century, nonetheless a net loss of intertidal zone of some 3000 ha has taken place since the mid-19th century. Around the estuary some 894 km2 of land are below the 5 m contour, protected by extensive coastal defences. Most of the sediment entering the estuary comes from the North Sea, and a large part of it is believed to come from the continuing erosion of the Holderness Cliffs, which form the coastline to the north of the estuary mouth at Spurn Head. The estuary currently has approximately 1,775 ha of saltmarsh

## 18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Sediment trapping

## 19. Wetland types:

Marine/coastal wetland

| Code | Name | % Area |
|---|---|---|
| F | Estuarine waters | 66.8 |
| G | Tidal flats | 26.4 |
| H | Salt marshes | 4.7 |
| E | Sand / shingle shores (including dune systems) | 0.8 |
| 7 | Gravel / brick / clay pits | 0.5 |
| Q | Saline / brackish lakes: permanent | 0.3 |
| J | Coastal brackish / saline lagoons | 0.3 |
| Other | Other | 0.1 |
| 9 | Canals and drainage channels | 0.01 |
| Y | Freshwater springs | 0.01 |

## 20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Description

Much of the intertidal area of the Humber Estuary consists of mudflats with fringing saltmarsh. There are smaller areas of intertidal sand flats, and sand dunes. The saltmarsh is both eroding and accreting; although coastal squeeze is resulting in net losses, and cord grass Spartina anglica is a major colonising species. In areas of reduced salinity such as the Upper Humber there are extensive areas of common reed Phragmites australis with some sea club-rush Bolboschoenus maritimus. Mid-level saltmarsh tends to be much more floristically diverse, and in the higher level marsh with its dendritic network of drainage channels, salt pans and borrow pits grasses dominate with thrift Armeria maritima where the marsh is grazed by cattle and sheep. Extensive areas of eel grass Zostera marina and Z. nolti have been known to occur at Spurn Bight, although in recent years records are limited. Behind the sandflats of the Cleethorpes coast the mature sand-dune vegetation contains some locally and nationally rare species including chestnut flat sedge Blysmus rufus, bulbous meadow grass Poa bulbosa and dense silky-bent Apera interrupta. The sand dunes, which cap the shingle spit that forms Spurn Peninsula are dominated by marram grass Ammophila arenaria and patches of dense sea buckthorn Hippophae rhamnoides.

Ecosystem services

Aesthetic

Education

Food

Recreation

Storm/wave protection

## 21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in **12**. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

None reported

## 22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in **12**. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

**Birds**

**Species Information**

Species Information
Birds
Species currently occurring at levels of national importance:

Great bittern, *Botaurus stellaris*
*stellaris* subspecies – W Europe, NW Africa (breeding) population
2 booming males, breeding, representing an average of 10.5% of the GB population
(3 year mean 2000-2002)

Eurasian marsh harrier, *Circus aeruginosus*
Europe population
10 females, breeding, representing an average of 6.3% of the GB population
(5 year mean 1998-2002)

Pied avocet, *Recurvirostra avosetta*
Western Europe (breeding) population
64 pairs, breeding, representing an average of 8.6% of the GB population
(5 year mean 1998-2002)

Little tern, *Sterna albifrons*
*albifrons* subspecies, Western Europe (breeding) population
51 pairs, breeding, representing an average of 2.1% of the GB population
(5 year mean 1998-2002)

Dark-bellied brent goose, *Branta bernicla*
*bernicla* subspecies
2,098 individuals, wintering, representing an average of 2.1% of the GB population
(5 year peak mean 1996/7-2000/1)

Eurasian wigeon, *Anas penelope*
Northwestern Europe (non-breeding) population
5,044 individuals, wintering, representing an average of 1.2% of the GB population
(5 year peak mean 1996/7-2000/1)

Common teal, *Anas crecca*
*crecca* subspecies, Northwestern Europe (non-breeding population)
2,322 individuals, wintering, representing an average of 1.2% of the GB population

(5 year peak mean 1996/7-2000/1)

Common pochard, *Aythya ferina*
Northeastern & Northwestern Europe (non-breeding) population
719 individuals, wintering, representing an average of 1.2% of the GB population
(5 year peak mean 1996/7-2000/1)

Greater scaup, *Aythya marila*
*marila* subspecies, Western Europe (non-breeding) population
127 individuals, wintering, representing an average of 1.7% of the GB population
(5 year peak mean 1996/7-2000/1)

Common goldeneye, *Bucephala clangula*
*clangula* subspecies, Northwestern & Central Europe (non-breeding) population
467 individuals, wintering, representing an average of 1.9% of the GB population
(5 year peak mean 1996/7-2000/1)

Great bittern, *Botaurus stellaris*
*stellaris* subspecies – W Europe, NW Africa (breeding) population
4 individuals, wintering, representing an average of 4.0% of the GB population
(5 year peak mean 1998/9-2002/3)

Hen harrier, *Circus cyaneus*
Europe population
8 individuals, wintering, representing an average of 1.1% of the GB population
(5 year peak mean 1997/8-2001/2)

Eurasian oystercatcher, *Haematopus ostralegus*
*ostralegus* subspecies
3,503 individuals, wintering, representing an average of 1.1% of the GB population
(5 year peak mean 1996/7-2000/1)

Pied avocet, *Recurvirostra avosetta*
Western Europe (breeding) population
59 individuals, wintering, representing an average of 1.7% of the GB population
(5 year peak mean 1996/7-2000/1)

Great ringed plover, *Charadrius hiaticula*
*hiaticula* subspecies
403 individuals, wintering, representing an average of 1.2% of the GB population
(5 year peak mean 1996/7-2000/1)

Grey plover, *Pluvialis squatarola*
*squatarola* subspecies, Eastern Atlantic (non-breeding) population
1,704 individuals, wintering, representing an average of 3.2% of the GB population
(5 year peak mean 1996/7-2000/1)

Northern lapwing, *Vanellus vanellus*
Europe (breeding) population
22,765 individuals, wintering, representing an average of 1.1% of the GB population
(5 year peak mean 1996/7-2000/1)

Sanderling, *Calidris alba*
Eastern Atlantic (non-breeding) population

486 individuals, wintering, representing an average of 2.3% of the GB population
(5 year peak mean 1996/7-2000/1)

Curlew, *Numenius arquata*
*arquata* subspecies
3,253 individuals, wintering, representing an average of 2.2% of the GB population
(5 year peak mean 1996/7-2000/1)

Ruddy turnstone, *Arenaria interpres*
*interpres* subspecies, Northeastern Canada & Greenland (breeding) population
629 individuals, wintering, representing an average of 1.3% of the GB population
(5 year peak mean 1996/7-2000/1)

Great ringed plover, *Charadrius hiaticula*
*psammodroma* subspecies
1,766 individuals, passage, representing an average of 5.9% of the GB population
(5 year peak mean 1996-2000)

Grey plover, *Pluvialis squatarola*
*squatarola* subspecies, Eastern Atlantic (non-breeding) population
1,590 individuals, passage, representing an average of 2.3% of the GB population
(5 year peak mean 1996-2000)

Sanderling, *Calidris alba*
Eastern Atlantic (non-breeding) population
818 individuals, passage, representing an average of 2.7% of the GB population
(5 year peak mean 1996-2000)

Ruff, *Philomachus pugnax*
Western Africa (non-breeding) population
128 individuals, passage, representing an average of 1.4% of the GB population
(5 year peak mean 1996-2000)

Whimbrel, *Numenius phaeopus*
*islandicus* subspecies
113 individuals, passage, representing an average of 2.3% of the GB population
(5 year peak mean 1996-2000)

Common greenshank, *Tringa nebularia*
Northwestern Europe (breeding) population
77 individuals, passage, representing an average of 5.5% of the GB population
(5 year peak mean 1996-2000)

## 23. Social and cultural values:

Describe if the site has any general social and/or cultural values e.g. fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

Aesthetic
Aquatic vegetation (e.g. reeds, willows, seaweed)
Archaeological/historical site
Environmental education/ interpretation
Fisheries production
Livestock grazing
Non-consumptive recreation

Sport fishing
Sport hunting
Tourism
Transportation/navigation

**b)** Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? No

If Yes, describe this importance under one or more of the following categories:

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

## 24. Land tenure/ownership:

| Ownership category | On-site | Off-site |
|---|---|---|
| Non-governmental organisation (NGO) | + | + |
| Local authority, municipality etc. | + | + |
| National/Crown Estate | + | + |
| Private | + | + |
| Public/communal | + | + |

## 25. Current land (including water) use:

| Activity | On-site | Off-site |
|---|---|---|
| Nature conservation | + | + |
| Tourism | + | + |
| Recreation | + | + |
| Current scientific research | + | |
| Cutting of vegetation (small-scale/subsistence) | + | |
| Fishing: commercial | + | + |
| Fishing: recreational/sport | + | + |
| Gathering of shellfish | + | + |
| Bait collection | + | + |
| Permanent arable agriculture | | + |
| Permanent pastoral agriculture | + | + |
| Hunting: recreational/sport | + | + |
| Industrial water supply | + | + |
| Industry | + | + |
| Sewage treatment/disposal | + | + |
| Harbour/port | + | + |

| | | |
|---|---|---|
| Flood control | + | + |
| Irrigation (incl. agricultural water supply) | | + |
| Mineral exploration (excl. hydrocarbons) | | + |
| Oil/gas exploration | + | + |
| Transport route | + | + |
| Domestic water supply | | + |
| Urban development | | + |
| Non-urbanised settlements | | + |
| Military activities | + | + |
| Horticulture (incl. market gardening) | | + |

---

**26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:**

*Explanation of reporting category:*

1. *Those factors that are still operating, but it is unclear if they are under control, as there is a lag in showing the management or regulatory regime to be successful.*
2. *Those factors that are not currently being managed, or where the regulatory regime appears to have been ineffective so far.*

*NA = Not Applicable because no factors have been reported.*

| Adverse Factor Category | Reporting Category | Description of the problem (Newly reported Factors only) | On-Site | Off-Site | Major Impact? |
|---|---|---|---|---|---|
| Disturbance to vegetation through cutting / clearing | 1 | Reedbeds being cut and cleared on margins of pits associated with angling. Management agreements and enforcement to address. | + | | |
| Vegetation succession | 1 | Lack of reedbed management leading to scrub encroachment. Management agreement to address. | + | | |
| Water diversion for irrigation/domestic/industrial use | 1 | Abstraction causes reduced freshwater input. Review of consents well advanced but not yet implemented. | + | + | |
| Overfishing | 2 | Substantial lamprey by-catch in eel nets in River Ouse. | | + | |
| Pollution – domestic sewage | 1 | Reduced dissolved oxygen in River Ouse is a barrier to fish migration. Review of consents well advanced but not yet implemented. | + | + | + |
| Pollution – agricultural fertilisers | 1 | Reduced dissolved oxygen in River Ouse is a barrier to fish migration. To be addressed through Catchment Sensitive Farming Initiatives and implementation of Water Framework Directive. | + | + | + |
| Recreational/tourism disturbance (unspecified) | 1 | Particularly illegal access by motorised recreational vehicles and craft. Control through management scheme. | + | | |

| | | | | | |
|---|---|---|---|---|---|
| Other factor | 1 | Coastal squeeze causing loss of intertidal habitats and saltmarsh due to sea level rise and fixed defences. The Humber Flood Risk Management Strategy has been developed and is being implemented. | + | | + |
| | | | | | |

| |
|---|
| For category 2 factors only.<br>What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors?<br>Overfishing - Overfishing – to be considered through an 'in-combination' assessment of possible factors as part of the Review of Consents exercise. |
| Is the site subject to adverse ecological change? YES |

## 27. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

| Conservation measure | On-site | Off-site |
|---|---|---|
| Site/ Area of Special Scientific Interest (SSSI/ASSI) | + | + |
| National Nature Reserve (NNR) | + | |
| Special Protection Area (SPA) | + | |
| Land owned by a non-governmental organisation for nature conservation | + | + |
| Management agreement | + | + |
| Site management statement/plan implemented | + | |
| Area of Outstanding National Beauty (AONB) | | + |
| Special Area of Conservation (SAC) | + | |
| IUCN (1994) category IV | + | |

**b)** Describe any other current management practices:
The management of Ramsar sites in the UK is determined by either a formal management plan or through other management planning processes, and is overseen by the relevant statutory conservation agency. Details of the precise management practises are given in these documents.

## 28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

No information available

## 29. Current scientific research and facilities:

e.g. details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

**Fauna.**
Numbers of migratory and wintering wildfowl and waders are monitored annually as part of the national Wetland Birds Survey (WeBS) organised by the British Trust for Ornithology, Wildfowl & Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee.
Seal populations are monitored by the Sea Mammal Research Unit
Humber Wader Ringing Group
Spurn Bird Observatory
National Nature Reserve monitoring

**Environment.**
Institute of Estuarine & Coastal Studies, Hull: various
Industrial Concerns: monitoring on behalf of companies such as Associated British Ports and BP
Environment Agency monitoring: various
Geomorphological studies associated with shoreline management planning
National Nature Reserve monitoring

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**30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:**

e.g. visitor centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

There are a four National Nature Reserves with associated facilities within the Ramsar site (Spurn, Far Ings, Donna Nook and Saltfleetby – Theddlethorpe Dunes) and a number of other visitor, information and/or education centres including the Spurn Bird Observatory, the Cleethorpes Discovery Centre, Water's Edge and Far Ings. A wide range of Humber wide and area-specific information is available through a range of media (eg leaflets, displays, internet etc) including 'Humber Estuary European Marine Site Codes of Conduct' developed with a range of stakeholders to cover a range of recreational and educational activities and 'Coastal Futures' – a partnership project working with local communities affected by flood risk and associated issues including managed realignment includes proactive education work within schools.

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**31. Current recreation and tourism:**

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

**Activities, Facilities provided and Seasonality.**

Sailing: marinas at Brough, Winteringham, Hull, Grimsby and South Ferriby.

Bathing etc: Cleethorpes (some 6m visitors/yr).

Walking/Horse riding: throughout

Beach fishing, match sea-fishing, non-commercial bait digging.

Non-commercial samphire collection

Wildfowling

Tourist amusements: Cleethorpes.

Bird watching: throughout but particularly at Blacktoft Sands RSPB reserve and the four National Nature Reserves.

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**32. Jurisdiction:**

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept. of Agriculture/Dept. of Environment, etc.

Head, Natura 2000 and Ramsar Team, Department for Environment, Food and Rural Affairs, European Wildlife Division, Zone 1/07, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6EB

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**33. Management authority:**

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Site Designations Manager, English Nature, Sites and Surveillance Team, Northminster House, Northminster Road, Peterborough, PE1 1UA, UK

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**34. Bibliographical references:**

Scientific/technical references only. If biogeographic regionalisation scheme applied (see **15** above), list full reference citation for the scheme.

## Site-relevant references

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# STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 (2011/484/EU).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the SPA homepage and SAC homepage on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

https://jncc.gov.uk/

# NATURA 2000 - STANDARD DATA FORM

**For Special Protection Areas (SPA),**
**Proposed Sites for Community Importance (pSCI),**
**Sites of Community Importance (SCI) and**
**for Special Areas of Conservation (SAC)**

| | |
|---|---|
| SITE | **UK9020329** |
| SITENAME | **Greater Wash** |

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## 1. SITE IDENTIFICATION

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| 1.1 Type | 1.2 Site code |
|---|---|
| A | UK9020329 |

### 1.3 Site name

Greater Wash

| 1.4 First Compilation date | 1.5 Update date |
|---|---|
| 2018-03 | - |

### 1.6 Respondent:


| | |
|---|---|
| **Name/Organisation:** | Joint Nature Conservation Committee |
| **Address:** | Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY |
| **Email:** | |


### 1.7 Site indication and designation / classification dates

| | |
|---|---|
| **Date site classified as SPA:** | 2018-03 |
| **National legal reference of SPA designation** | Regulations 15 and 17-19 of The Conservation of Habitats and Species Regulations 2017 (https://www.legislation.gov.uk/uksi/2017/1012/contents/made), and Regulations 12, 19 and 20 of The Conservation of Offshore Marine Habitats and Species Regulations 2017 (http://www.legislation.gov.uk/uksi/2017/1013/contents/made). |

## 2. SITE LOCATION

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### 2.1 Site-centre location [decimal degrees]:

| Longitude | Latitude |
|---|---|
| 0.7264 | 53.2356 |

| 2.2 Area [ha]: | 2.3 Marine area [%] |
|---|---|
| 353577.86 | 100.0 |

### 2.5 Administrative region code and name

| NUTS level 2 code | Region Name |
|---|---|
| UKH1 | East Anglia |
| UKF3 | Lincolnshire |
| UKZZ | Extra-Regio |
| UKE1 | East Yorkshire and Northern Lincolnshire |

### 2.6 Biogeographical Region(s)

Atlantic (100.0 %)

## 3. ECOLOGICAL INFORMATION

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### 3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

| Species | | | | | Population in the site | | | | | | Site assessment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | Code | Scientific Name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. | Glo. |
| B | A001 | Gavia stellata | | | w | 1407 | 1407 | i | | G | B | | C | |
| B | A177 | Larus minutus | | | w | 1255 | 1255 | i | | M | | | C | |
| B | A065 | Melanitta nigra | | | w | 3449 | 3449 | i | | G | A | | C | |
| B | A195 | Sterna albifrons | | | r | 798 | 798 | p | | G | A | | C | |
| B | A193 | Sterna hirundo | | | r | 510 | 510 | p | | G | B | | C | |
| B | A191 | Sterna sandvicensis | | | r | 3852 | 3852 | p | | G | A | | C | |

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)

- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

# 4. SITE DESCRIPTION

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## 4.1 General site character

| Habitat class | % Cover |
|---|---|
| N01 | 99.0 |
| N02 | 1.0 |
| **Total Habitat Cover** | 100 |

### Other Site Characteristics

3 Marine: Geology: a mixture of coarse sediments, sand, mud, muddy sand and mixed sediments. 4 Marine: Geomorphology: intertidal mudflats and sandflats, subtidal sandbanks and biogenic reef, including Sabellaria reefs and mussel beds.

## 4.2 Quality and importance

ARTICLE 4.1 QUALIFICATION (79/409/EEC): During the breeding season the area supports Annex I populations of little tern (Sternula albifrons) (798 pairs, 5-year peak mean 2009-2013, 42% of GB breeding population), common tern (Sterna hirundo) (510 pairs, 5-year peak mean 2010-2014, 5.1% of GB breeding population) and Sandwich tern (Sterna sandvicensis) (3,852 pairs, 5-year peak mean 2010-2014, 35% of GB breeding population) (stage 1.1). During the winter, the site also supports populations of overwintering Annex I species: little gull (Hydrocoloeus minutus) (1,255 peak mean 2004/05-2005/06, no current GB population estimate) (stage 1.4) and red-throated diver (Gavia stellata) (1,407 individuals, 5-year peak mean 2002/03-2005/06, 8.3% of GB non-breeding population) (stage 1.1). ARTICLE 4.2 QUALIFICATION (2009/147/EC): Site regularly supports 3,449 Common scoter (Melanitta nigra) (5-year peak mean 2002/03-2007/08, 0.6% of biogeographic population), a regularly occurring migratory species not listed in Annex I of the EC Birds Directive is also supported within the site (stage 1.4).

## 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

| Negative Impacts | | | |
|---|---|---|---|
| Rank | Threats and pressures [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |
| M | G01 | | b |
| M | D03 | | b |
| H | C03 | | b |
| L | H03 | | b |
| L | F02 | | i |

| Positive Impacts | | | |
|---|---|---|---|
| Rank | Activities, management [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

## 4.5 Documentation

The weblink 'http://jncc.defra.gov.uk/page-6895' allows access to site specific information for all marine MPAs in UK offshore waters.

Link(s): http://consult.defra.gov.uk/natural-england-marine/greater-wash-potential-special-protection-area-com/supporting_docur

http://publications.naturalengland.org.uk/publication/4597871528116224

## 6. SITE MANAGEMENT

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### 6.1 Body(ies) responsible for the site management:

| | |
|---|---|
| Organisation: | Natural England |
| Address: | |
| Email: | |

| | |
|---|---|
| Organisation: | For information about relevant management offshore please contact JNCC |
| Address: | |
| Email: | |

### 6.2 Management Plan(s):

An actual management plan does exist:

- [ ] Yes
- [ ] No, but in preparation
- [x] No

### 6.3 Conservation measures (optional)

For available information on relevant conservation measures of the site, including the Conservation Objectives, see section 4.5.

## 7. MAP OF THE SITES

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INSPIRE ID:

Map delivered as PDF in electronic format (optional)

[ ] Yes [X] No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

# EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the official European Union guidelines for the Standard Data Form (also referencing the relevant page number).

1.1 Site type

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | SPA (classified Special Protection Area) | 53 |
| B | cSAC, SCI or SAC (candidate Special Area of Conservation, Site of Community Importance, designated Special Area of Conservation) | 53 |
| C | SPA area/boundary is the same as the cSAC/SCI/SAC i.e. a co-classified/designated site (Note: this situation only occurs in Gibraltar) | 53 |

3.1 Habitat code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| 1110 | Sandbanks which are slightly covered by sea water all the time | 57 |
| 1130 | Estuaries | 57 |
| 1140 | Mudflats and sandflats not covered by seawater at low tide | 57 |
| 1150 | Coastal lagoons | 57 |
| 1160 | Large shallow inlets and bays | 57 |
| 1170 | Reefs | 57 |
| 1180 | Submarine structures made by leaking gases | 57 |
| 1210 | Annual vegetation of drift lines | 57 |
| 1220 | Perennial vegetation of stony banks | 57 |
| 1230 | Vegetated sea cliffs of the Atlantic and Baltic Coasts | 57 |
| 1310 | Salicornia and other annuals colonizing mud and sand | 57 |
| 1320 | Spartina swards (Spartinion maritimae) | 57 |
| 1330 | Atlantic salt meadows (Glauco-Puccinellietalia maritimae) | 57 |
| 1340 | Inland salt meadows | 57 |
| 1420 | Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi) | 57 |
| 2110 | Embryonic shifting dunes | 57 |
| 2120 | Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") | 57 |
| 2130 | Fixed coastal dunes with herbaceous vegetation ("grey dunes") | 57 |
| 2140 | Decalcified fixed dunes with Empetrum nigrum | 57 |
| 2150 | Atlantic decalcified fixed dunes (Calluno-Ulicetea) | 57 |
| 2160 | Dunes with Hippopha• rhamnoides | 57 |
| 2170 | Dunes with Salix repens ssp. argentea (Salicion arenariae) | 57 |
| 2190 | Humid dune slacks | 57 |
| 21A0 | Machairs (* in Ireland) | 57 |
| 2250 | Coastal dunes with Juniperus spp. | 57 |
| 2330 | Inland dunes with open Corynephorus and Agrostis grasslands | 57 |
| 3110 | Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) | 57 |
| 3130 | Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea | 57 |
| 3140 | Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. | 57 |
| 3150 | Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation | 57 |

3.1 Habitat representativity (abbreviated to ‘Representativity’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent representatively | 57 |
| B | Good representatively | 57 |
| C | Significant representatively | 57 |
| D | Non-significant presence representatively | 57 |

3.1 Relative surface

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 58 |
| B | > 2%-15% | 58 |
| C | ≤ 2% | 58 |

3.1 Degree of conservation (abbreviated to ‘Conservation’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent conservation | 59 |
| B | Good conservation | 59 |
| C | Average or reduced conservation | 59 |

3.1 Global assessment (abbreviated to ‘Global’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent value | 59 |
| B | Good value | 59 |
| C | Significant value | 59 |

3.2 Population (abbreviated to ‘Pop.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 62 |
| B | > 2%-15% | 62 |
| C | ≤ 2% | 62 |
| D | Non-significant population | 62 |

3.2 Degree of conservation (abbreviated to ‘Con.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent conservation | 63 |
| B | Good conservation | 63 |
| C | Average or reduced conservation | 63 |

3.2 Isolation (abbreviated to ‘Iso.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Population (almost) Isolated | 63 |
| B | Population not-isolated, but on margins of area of distribution | 63 |
| C | Population not-isolated within extended distribution range | 63 |

3.2 Global Grade (abbreviated to ‘Glo.’ or ‘G.’ in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent value | 63 |
| B | Good value | 63 |
| C | Significant value | 63 |

3.3 Other species – essentially covers bird assemblage types

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| WATR | Non-breeding waterbird assemblage | UK specific code |
| SBA | Breeding seabird assemblage | UK specific code |

| | | |
|---|---|---|
| BBA | Breeding bird assemblage (applies only to sites classified pre 2000) | UK specific code |

### 4.1 Habitat class code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| N01 | Marine areas, Sea inlets | 65 |
| N02 | Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins) | 65 |
| N03 | Salt marshes, Salt pastures, Salt steppes | 65 |
| N04 | Coastal sand dunes, Sand beaches, Machair | 65 |
| N05 | Shingle, Sea cliffs, Islets | 65 |
| N06 | Inland water bodies (Standing water, Running water) | 65 |
| N07 | Bogs, Marshes, Water fringed vegetation, Fens | 65 |
| N08 | Heath, Scrub, Maquis and Garrigue, Phygrana | 65 |
| N09 | Dry grassland, Steppes | 65 |
| N10 | Humid grassland, Mesophile grassland | 65 |
| N11 | Alpine and sub-Alpine grassland | 65 |
| N14 | Improved grassland | 65 |
| N15 | Other arable land | 65 |
| N16 | Broad-leaved deciduous woodland | 65 |
| N17 | Coniferous woodland | 65 |
| N19 | Mixed woodland | 65 |
| N21 | Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas) | 65 |
| N22 | Inland rocks, Screes, Sands, Permanent Snow and ice | 65 |
| N23 | Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites) | 65 |
| N25 | Grassland and scrub habitats (general) | 65 |
| N26 | Woodland habitats (general) | 65 |

### 4.3 Threats code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A01 | Cultivation | 65 |
| A02 | Modification of cultivation practices | 65 |
| A03 | Mowing / cutting of grassland | 65 |
| A04 | Grazing | 65 |
| A05 | Livestock farming and animal breeding (without grazing) | 65 |
| A06 | Annual and perennial non-timber crops | 65 |
| A07 | Use of biocides, hormones and chemicals | 65 |
| A08 | Fertilisation | 65 |
| A10 | Restructuring agricultural land holding | 65 |
| A11 | Agriculture activities not referred to above | 65 |
| B01 | Forest planting on open ground | 65 |
| B02 | Forest and Plantation management & use | 65 |
| B03 | Forest exploitation without replanting or natural regrowth | 65 |
| B04 | Use of biocides, hormones and chemicals (forestry) | 65 |
| B06 | Grazing in forests/ woodland | 65 |
| B07 | Forestry activities not referred to above | 65 |
| C01 | Mining and quarrying | 65 |
| C02 | Exploration and extraction of oil or gas | 65 |
| C03 | Renewable abiotic energy use | 65 |
| D01 | Roads, paths and railroads | 65 |
| D02 | Utility and service lines | 65 |
| D03 | Shipping lanes, ports, marine constructions | 65 |
| D04 | Airports, flightpaths | 65 |
| D05 | Improved access to site | 65 |
| E01 | Urbanised areas, human habitation | 65 |
| E02 | Industrial or commercial areas | 65 |

## 5.1 Designation type codes

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| UK00 | No Protection Status | 67 |
| UK01 | National Nature Reserve | 67 |
| UK04 | Site of Special Scientific Interest (GB) | 67 |
| UK05 | Marine Conservation Zone | 67 |
| UK06 | Nature Conservation Marine Protected Area | 67 |
| UK86 | Special Area (Channel Islands) | 67 |
| UK98 | Area of Special Scientific Interest (NI) | 67 |
| IN00 | Ramsar Convention site | 67 |
| IN08 | Special Protection Area | 67 |
| IN09 | Special Area of Conservation | 67 |

# STANDARD DATA FORM for sites within the 'UK national site network of European sites'

Special Protection Areas (SPAs) are classified and Special Areas of Conservation (SACs) are designated under:

- the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea) and to a limited extent in Scotland (reserved matters) and Northern Ireland (excepted matters);
- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland;
- the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) in Northern Ireland; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in the UK offshore area.

Each SAC or SPA (forming part of the UK national site network of European sites) has its own Standard Data Form containing site-specific information. The information provided here generally follows the same documenting format for SACs and SPAs, as set out in the Official Journal of the European Union recording the Commission Implementing Decision of 11 July 2011 (2011/484/EU).

Please note that these forms contain a number of codes, all of which are explained either within the data forms themselves or in the end notes.

More general information on SPAs and SACs in the UK is available from the SPA homepage and SAC homepage on the JNCC website. These webpages also provide links to Standard Data Forms for all SAC and SPA sites in the UK.

https://jncc.gov.uk/

# NATURA 2000 - STANDARD DATA FORM

**For Special Protection Areas (SPA),**
**Proposed Sites for Community Importance (pSCI),**
**Sites of Community Importance (SCI) and**
**for Special Areas of Conservation (SAC)**

| | |
|---|---|
| SITE | **UK0017075** |
| SITENAME | **The Wash and North Norfolk Coast** |

## TABLE OF CONTENTS



## 1. SITE IDENTIFICATION

Back to top

| 1.1 Type | 1.2 Site code |
|---|---|
| B | UK0017075 |

### 1.3 Site name

The Wash and North Norfolk Coast

| 1.4 First Compilation date | 1.5 Update date |
|---|---|
| 1996-10 | 2015-12 |

### 1.6 Respondent:


| | |
|---|---|
| **Name/Organisation:** | Joint Nature Conservation Committee |
| **Address:** | Joint Nature Conservation Committee Monkstone House City Road Peterborough PE1 1JY |
| **Email:** | |


| | |
|---|---|
| **Date site proposed as SCI:** | 1996-10 |
| **Date site confirmed as SCI:** | 2004-12 |
| **Date site designated as SAC:** | 2005-04 |
| **National legal reference of SAC designation:** | Regulations 11 and 13-15 of the Conservation of Habitats and Species Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/490/contents/made). |

## 2. SITE LOCATION

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### 2.1 Site-centre location [decimal degrees]:

| Longitude | Latitude |
|---|---|
| 0.318055556 | 52.93694444 |

| 2.2 Area [ha]: | 2.3 Marine area [%] |
|---|---|
| 107718.0 | 94.3 |

**2.4 Sitelength [km]:**

0.0

### 2.5 Administrative region code and name

| NUTS level 2 code | Region Name |
|---|---|
| UKH1 | East Anglia |
| UKF3 | Lincolnshire |

### 2.6 Biogeographical Region(s)

Atlantic (100.0 %)

## 3. ECOLOGICAL INFORMATION

Back to top

### 3.1 Habitat types present on the site and assessment for them

| Annex I Habitat types | | | | | | Site assessment | | | |
|---|---|---|---|---|---|---|---|---|---|
| Code | PF | NP | Cover [ha] | Cave [number] | Data quality | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Representativity | Relative Surface | Conservation | Global |
| 1110 | | | 44164.38 | 0 | M | A | B | B | A |
| 1140 | | | 18312.06 | 0 | M | A | B | A | A |
| 1150 | X | | 21.54 | 0 | G | C | C | B | C |
| 1160 | | | 42010.02 | 0 | M | A | B | B | A |
| 1170 | | | | 0 | | A | C | A | A |
| 1310 | | | 430.87 | 0 | P | A | A | A | A |
| 1320 | | | | 0 | | D | | | |
| 1330 | | | 2800.67 | 0 | P | A | B | A | A |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1420 | | | 107.72 | 0 | P | A | A | A | A |

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

### 3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

| Species | | | | | Population in the site | | | | | | Site assessment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | Code | Scientific Name | S | NP | T | Size | | Unit | Cat. | D.qual. | A\|B\|C\|D | A\|B\|C | | |
| | | | | | | Min | Max | | | | Pop. | Con. | Iso. | Glo. |
| M | 1364 | Halichoerus grypus | | | p | | | | P | DD | D | | | |
| M | 1355 | Lutra lutra | | | p | | | | V | DD | C | C | C | C |
| M | 1365 | Phoca vitulina | | | p | 1001 | 10000 | i | | M | B | B | C | A |

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

## 4. SITE DESCRIPTION

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### 4.1 General site character

| Habitat class | % Cover |
|---|---|
| N01 | 51.0 |
| N02 | 46.0 |
| N03 | 3.0 |
| **Total Habitat Cover** | 100 |

**Other Site Characteristics**

1 Terrestrial: Soil & Geology: sandstone,sand,nutrient-rich,alluvium,mud,clay,shingle 2 Terrestrial: Geomorphology and landscape: coastal 3 Marine:
Geology: limestone/chalk,gravel,sand,chert/flint,mud,biogenic reef,peat,shingle 4 Marine:

| |
|---|
| Geomorphology: barrier beach,enclosed coast (including embayment),estuary,subtidal sediments (including sandbank/mudbank),lagoon,intertidal sediments (including sandflat/mudflat),open coast (including bay),shingle bar |

### 4.2 Quality and importance

| |
|---|
| Sandbanks which are slightly covered by sea water all the time for which this is considered to be one of the best areas in the United Kingdom. Mudflats and sandflats not covered by seawater at low tide for which this is considered to be one of the best areas in the United Kingdom. Coastal lagoons for which the area is considered to support a significant presence. Large shallow inlets and bays for which this is considered to be one of the best areas in the United Kingdom. Reefs for which this is considered to be one of the best areas in the United Kingdom. Salicornia and other annuals colonising mud and sand for which this is considered to be one of the best areas in the United Kingdom. Atlantic salt meadows (Glauco-Puccinellietalia maritimae) for which this is considered to be one of the best areas in the United Kingdom. Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi) for which this is one of only four known outstanding localities in the United Kingdom. which is considered to be rare as its total extent in the United Kingdom is estimated to be less than 1000 hectares. Lutra lutra for which the area is considered to support a significant presence. Phoca vitulina for which this is considered to be one of the best areas in the United Kingdom. |

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

| Negative Impacts | | | |
|---|---|---|---|
| Rank | Threats and pressures [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |
| H | M01 | | B |
| H | F02 | | I |
| H | G01 | | I |
| H | A02 | | I |
| H | J02 | | B |

| Positive Impacts | | | |
|---|---|---|---|
| Rank | Activities, management [code] | Pollution (optional) [code] | inside/outside [i\|o\|b] |
| H | A04 | | I |
| H | A02 | | I |
| H | D05 | | I |
| H | D05 | | I |
| H | G03 | | I |

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,
T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

### 4.5 Documentation

| |
|---|
| Conservation Objectives - the Natural England links below provide access to the Conservation Objectives (and other site-related information) for its terrestrial and inshore Natura 2000 sites, including conservation advice packages and supporting documents for European Marine Sites within English waters and for cross-border sites. See also the 'UK Approach' document for more information (link via the JNCC website). |

Link(s): **http://publications.naturalengland.org.uk/category/6490068894089216**

**http://publications.naturalengland.org.uk/category/3212324**
**http://jncc.defra.gov.uk/pdf/Natura2000_StandardDataForm_UKApproach_Dec2015.pdf**

## 5. SITE PROTECTION STATUS (optional)

Back to top

### 5.1 Designation types at national and regional level:

| Code | Cover [%] | Code | Cover [%] | Code | Cover [%] |
|---|---|---|---|---|---|
| UK04 | 61.4 | UK01 | 2.8 | UK00 | 38.7 |

## 6. SITE MANAGEMENT

Back to top

### 6.1 Body(ies) responsible for the site management:

| | |
|---|---|
| Organisation: | Natural England |
| Address: | |
| Email: | |

### 6.2 Management Plan(s):

An actual management plan does exist:

- [ ] Yes
- [ ] No, but in preparation
- [x] No

### 6.3 Conservation measures (optional)

For available information, including on Conservation Objectives, see Section 4.5.

# EXPLANATION OF CODES USED IN THE SPECIAL AREA OF CONSERVATION (SAC) AND SPECIAL PROTECTION AREA (SPA) STANDARD DATA FORMS

The codes in the table below generally follow those explained in the official European Union guidelines for the Standard Data Form (also referencing the relevant page number).

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3.1 Habitat code

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|---|---|---|
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| 1160 | Large shallow inlets and bays | 57 |
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| 1180 | Submarine structures made by leaking gases | 57 |
| 1210 | Annual vegetation of drift lines | 57 |
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| 1230 | Vegetated sea cliffs of the Atlantic and Baltic Coasts | 57 |
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| 1330 | Atlantic salt meadows (Glauco-Puccinellietalia maritimae) | 57 |
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| 2110 | Embryonic shifting dunes | 57 |
| 2120 | Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") | 57 |
| 2130 | Fixed coastal dunes with herbaceous vegetation ("grey dunes") | 57 |
| 2140 | Decalcified fixed dunes with Empetrum nigrum | 57 |
| 2150 | Atlantic decalcified fixed dunes (Calluno-Ulicetea) | 57 |
| 2160 | Dunes with Hippopha• rhamnoides | 57 |
| 2170 | Dunes with Salix repens ssp. argentea (Salicion arenariae) | 57 |
| 2190 | Humid dune slacks | 57 |
| 21A0 | Machairs (* in Ireland) | 57 |
| 2250 | Coastal dunes with Juniperus spp. | 57 |
| 2330 | Inland dunes with open Corynephorus and Agrostis grasslands | 57 |
| 3110 | Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) | 57 |
| 3130 | Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea | 57 |
| 3140 | Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. | 57 |
| 3150 | Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation | 57 |

3.1 Habitat representativity (abbreviated to 'Representativity' in data form)

| CODE | DESCRIPTION | PAGE NO |
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| B | Good representatively | 57 |
| C | Significant representatively | 57 |
| D | Non-significant presence representatively | 57 |

3.1 Relative surface

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 58 |
| B | > 2%-15% | 58 |
| C | ≤ 2% | 58 |

3.1 Degree of conservation (abbreviated to 'Conservation' in data form)

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3.1 Global assessment (abbreviated to 'Global' in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent value | 59 |
| B | Good value | 59 |
| C | Significant value | 59 |

3.2 Population (abbreviated to 'Pop.' in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | > 15%-100% | 62 |
| B | > 2%-15% | 62 |
| C | ≤ 2% | 62 |
| D | Non-significant population | 62 |

3.2 Degree of conservation (abbreviated to 'Con.' in data form)

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A | Excellent conservation | 63 |
| B | Good conservation | 63 |
| C | Average or reduced conservation | 63 |

3.2 Isolation (abbreviated to 'Iso.' in data form)

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|---|---|---|
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3.2 Global Grade (abbreviated to 'Glo.' or 'G.' in data form)

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| B | Good value | 63 |
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3.3 Other species – essentially covers bird assemblage types

| CODE | DESCRIPTION | PAGE NO |
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| SBA | Breeding seabird assemblage | UK specific code |

| | | |
|---|---|---|
| BBA | Breeding bird assemblage (applies only to sites classified pre 2000) | UK specific code |

### 4.1 Habitat class code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| N01 | Marine areas, Sea inlets | 65 |
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| N03 | Salt marshes, Salt pastures, Salt steppes | 65 |
| N04 | Coastal sand dunes, Sand beaches, Machair | 65 |
| N05 | Shingle, Sea cliffs, Islets | 65 |
| N06 | Inland water bodies (Standing water, Running water) | 65 |
| N07 | Bogs, Marshes, Water fringed vegetation, Fens | 65 |
| N08 | Heath, Scrub, Maquis and Garrigue, Phygrana | 65 |
| N09 | Dry grassland, Steppes | 65 |
| N10 | Humid grassland, Mesophile grassland | 65 |
| N11 | Alpine and sub-Alpine grassland | 65 |
| N14 | Improved grassland | 65 |
| N15 | Other arable land | 65 |
| N16 | Broad-leaved deciduous woodland | 65 |
| N17 | Coniferous woodland | 65 |
| N19 | Mixed woodland | 65 |
| N21 | Non-forest areas cultivated with woody plants (including Orchards, groves, Vineyards, Dehesas) | 65 |
| N22 | Inland rocks, Screes, Sands, Permanent Snow and ice | 65 |
| N23 | Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites) | 65 |
| N25 | Grassland and scrub habitats (general) | 65 |
| N26 | Woodland habitats (general) | 65 |

### 4.3 Threats code

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| A01 | Cultivation | 65 |
| A02 | Modification of cultivation practices | 65 |
| A03 | Mowing / cutting of grassland | 65 |
| A04 | Grazing | 65 |
| A05 | Livestock farming and animal breeding (without grazing) | 65 |
| A06 | Annual and perennial non-timber crops | 65 |
| A07 | Use of biocides, hormones and chemicals | 65 |
| A08 | Fertilisation | 65 |
| A10 | Restructuring agricultural land holding | 65 |
| A11 | Agriculture activities not referred to above | 65 |
| B01 | Forest planting on open ground | 65 |
| B02 | Forest and Plantation management & use | 65 |
| B03 | Forest exploitation without replanting or natural regrowth | 65 |
| B04 | Use of biocides, hormones and chemicals (forestry) | 65 |
| B06 | Grazing in forests/ woodland | 65 |
| B07 | Forestry activities not referred to above | 65 |
| C01 | Mining and quarrying | 65 |
| C02 | Exploration and extraction of oil or gas | 65 |
| C03 | Renewable abiotic energy use | 65 |
| D01 | Roads, paths and railroads | 65 |
| D02 | Utility and service lines | 65 |
| D03 | Shipping lanes, ports, marine constructions | 65 |
| D04 | Airports, flightpaths | 65 |
| D05 | Improved access to site | 65 |
| E01 | Urbanised areas, human habitation | 65 |
| E02 | Industrial or commercial areas | 65 |

## 5.1 Designation type codes

| CODE | DESCRIPTION | PAGE NO |
|---|---|---|
| UK00 | No Protection Status | 67 |
| UK01 | National Nature Reserve | 67 |
| UK04 | Site of Special Scientific Interest (GB) | 67 |
| UK05 | Marine Conservation Zone | 67 |
| UK06 | Nature Conservation Marine Protected Area | 67 |
| UK86 | Special Area (Channel Islands) | 67 |
| UK98 | Area of Special Scientific Interest (NI) | 67 |
| IN00 | Ramsar Convention site | 67 |
| IN08 | Special Protection Area | 67 |
| IN09 | Special Area of Conservation | 67 |

# Appendix D: Summary Table of Sites, Features and Effects

# Immingham Green Energy Terminal

## Shadow Habitats Regulations Assessment: Appendix D

Associated British Ports

July 2024

# Appendix D: Summary Table of Sites, Features and Effects

| **Key** | | | | |
|---|---|---|---|---|
| | N/A | Effects are not relevant to this feature | N/R | HRA stage not required |
| | No LSE | Likely Significant Effect can be excluded | LSE | Likely Significant Effect cannot be excluded |
| | No AEOI | Adverse Effect On Integrity can be excluded | AEOI | Adverse Effect On Integrity cannot be excluded |
| | C | Construction | O | Operation |
| | D | Decommissioning | | |

**Table D1. European sites and qualifying features, and each pathway of effect considered at each relevant HRA Stage for each phase of the Project**

| Site | Qualifying features | HRA Stage | Physical loss of habitat and associated species (Section 4.3) | | | Physical damage through disturbance and/or smothering of habitat (Section 4.4) | | | Physical loss or damage of habitat through alterations in physical processes (Section 4.5) | | | Direct changes to qualifying habitats beneath marine infrastructure due to shading (Section 4.6) | | | Physical change to habitats resulting from the deposition of airborne pollutants (Section 4.7) | | | Non-toxic contamination through elevated suspended sediment concentrations (Section 4.8) | | | Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases (Section 4.9) | | | Airborne noise and visual disturbance (Section 4.10) | | | Disturbance through underwater noise and vibration (Section 4.11) | | | Biological disturbance due to potential introduction and spread of non-native species (Section 4.12) | | | Changes to foraging and behaviour due to artificial lighting (Section 4.13) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D |
| Humber Estuary SAC | H1110. Sandbanks which are slightly covered by sea water all the time; Subtidal sandbanks | Stage 1 Screening | No LSE | No LSE | N/A | LSE | N/A | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | LSE | N/A | N/A | LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/A | N/R | N/A | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | N/R | N/R | N/R | N/R |
| | H1130. Estuaries | Stage 1 Screening | LSE | No LSE | N/A | LSE | LSE | N/A | LSE | No LSE | N/A | No LSE | LSE | N/A | No LSE | No LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | No AEOI | N/R | N/R | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | N/R | N/R | N/R | N/R |
| | H1140. Mudflats and sandflats not covered by seawater at low tide; Intertidal mudflats and sandflats | Stage 1 Screening | LSE | No LSE | N/A | LSE | LSE | N/A | LSE | No LSE | N/A | No LSE | LSE | N/A | No LSE | No LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | No AEOI | N/R | N/R | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | N/R | N/R | N/R | N/R |
| | H1150. Coastal lagoons | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | --No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | H1310. *Salicornia* and other annuals colonising mud and sand; Glasswort and other annuals colonising mud and sand | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |

| Site | Qualifying features | HRA Stage | Physical loss of habitat and associated species (Section 4.3) | | | Physical damage through disturbance and/or smothering of habitat (Section 4.4) | | | Physical loss or damage of habitat through alterations in physical processes (Section 4.5) | | | Direct changes to qualifying habitats beneath marine infrastructure due to shading (Section 4.6) | | | Physical change to habitats resulting from the deposition of airborne pollutants (Section 4.7) | | | Non-toxic contamination through elevated suspended sediment concentrations (Section 4.8) | | | Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases (Section 4.9) | | | Airborne noise and visual disturbance (Section 4.10) | | | Disturbance through underwater noise and vibration (Section 4.11) | | | Biological disturbance due to potential introduction and spread of non-native species (Section 4.12) | | | Changes to foraging and behaviour due to artificial lighting (Section 4.13) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D |
| | H1330. Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | H2110. Embryonic shifting dunes | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | H2120. Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); Shifting dunes with Marram | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | H2130. Fixed dunes with herbaceous vegetation ("grey dunes"); Dune grassland | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | H2160. Dunes with *Hippophae rhamnoides;* Dunes with sea-buckthorn | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | S1095. *Petromyzon marinus*; Sea lamprey | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | S1099. *Lampetra fluviatilis;* River lamprey | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |

| Site | Qualifying features | HRA Stage | Physical loss of habitat and associated species (Section 4.3) | | | Physical damage through disturbance and/or smothering of habitat (Section 4.4) | | | Physical loss or damage of habitat through alterations in physical processes (Section 4.5) | | | Direct changes to qualifying habitats beneath marine infrastructure due to shading (Section 4.6) | | | Physical change to habitats resulting from the deposition of airborne pollutants (Section 4.7) | | | Non-toxic contamination through elevated suspended sediment concentrations (Section 4.8) | | | Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases (Section 4.9) | | | Airborne noise and visual disturbance (Section 4.10) | | | Disturbance through underwater noise and vibration (Section 4.11) | | | Biological disturbance due to potential introduction and spread of non-native species (Section 4.12) | | | Changes to foraging and behaviour due to artificial lighting (Section 4.13) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D |
| | S1364. *Halichoerus grypus;* Grey seal | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | No LSE | LSE | No LSE | N/A | N/A | N/A | N/A | No LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| Humber Estuary SPA | A021 *Botaurus stellaris;* Great bittern (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A021 *Botaurus stellaris*; Great bittern (Breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A048 *Tadorna tadorna;* Common shelduck (Non-breeding) | Stage 1 Screening | LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | LSE | N/A | N/A | N/A | N/A | N/A | N/A | LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI |
| | A081 *Circus aeruginosus;* Eurasian marsh harrier (Breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A082 *Circus cyaneus;* Hen harrier (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A132 *Recurvirostra avosetta*; Pied avocet (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |

| Site | Qualifying features | HRA Stage | Physical loss of habitat and associated species (Section 4.3) | | | Physical damage through disturbance and/or smothering of habitat (Section 4.4) | | | Physical loss or damage of habitat through alterations in physical processes (Section 4.5) | | | Direct changes to qualifying habitats beneath marine infrastructure due to shading (Section 4.6) | | | Physical change to habitats resulting from the deposition of airborne pollutants (Section 4.7) | | | Non-toxic contamination through elevated suspended sediment concentrations (Section 4.8) | | | Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases (Section 4.9) | | | Airborne noise and visual disturbance (Section 4.10) | | | Disturbance through underwater noise and vibration (Section 4.11) | | | Biological disturbance due to potential introduction and spread of non-native species (Section 4.12) | | | Changes to foraging and behaviour due to artificial lighting (Section 4.13) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D |
| | A132 *Recurvirostra avosetta*; Pied avocet (Breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A140 *Pluvialis apricaria*; European golden plover (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A143 *Calidris canutus*; Red knot (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI |
| | A149 *Calidris alpina alpina;* Dunlin (Non-breeding) | Stage 1 Screening | LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | LSE | N/A | N/A | N/A | N/A | N/A | N/A | LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI |
| | A151 *Philomachus pugnax;* Ruff (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A156 *Limosa limosa islandica*; Black-tailed godwit (Non-breeding) | Stage 1 Screening | LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | LSE | N/A | N/A | N/A | N/A | N/A | N/A | LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI |
| | A157 *Limosa lapponica*; Bar-tailed godwit (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI |

| Site | Qualifying features | HRA Stage | Physical loss of habitat and associated species (Section 4.3) | | | Physical damage through disturbance and/or smothering of habitat (Section 4.4) | | | Physical loss or damage of habitat through alterations in physical processes (Section 4.5) | | | Direct changes to qualifying habitats beneath marine infrastructure due to shading (Section 4.6) | | | Physical change to habitats resulting from the deposition of airborne pollutants (Section 4.7) | | | Non-toxic contamination through elevated suspended sediment concentrations (Section 4.8) | | | Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases (Section 4.9) | | | Airborne noise and visual disturbance (Section 4.10) | | | Disturbance through underwater noise and vibration (Section 4.11) | | | Biological disturbance due to potential introduction and spread of non-native species (Section 4.12) | | | Changes to foraging and behaviour due to artificial lighting (Section 4.13) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D |
| | A162 *Tringa totanus*; Common redshank (Non-breeding) | Stage 1 Screening | LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | LSE | N/A | N/A | N/A | N/A | N/A | N/A | LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AE OI | N/R | N/R | N/R | N/R | N/R | N/R | No AE OI | No AE OI | No AE OI |
| | A195 *Sterna albifrons*; Little tern (Breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | Waterbird assemblage | Stage 1 Screening | LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | LSE | N/A | N/A | N/A | N/A | N/A | N/A | LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AE OI | N/R | N/R | N/R | N/R | N/R | N/R | No AE OI | No AE OI | No AE OI |
| Humber Estuary Ramsar | Criterion 1 – natural wetland habitats that are of international importance: Near-natural estuary with component habitats, specifically dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. | Stage 1 Screening | LSE | No LSE | N/A | LSE | LSE | N/A | LSE | No LSE | N/A | No LSE | LSE | N/A | No LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | No AEOI | N/R | N/R | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | N/R | N/R | N/R | N/R |
| | Criterion 3 – supports populations of plants and/or animal species of international importance: Breeding colony of grey seals *Halichoerus grypus* at Donna Nook. | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | No LSE | LSE | No LSE | N/A | N/A | N/A | N/A | No LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D |
| | Criterion 5 – Bird Assemblages of International Importance: Wintering waterfowl. | Stage 1 Screening | LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | LSE | N/A | N/A | N/A | N/A | N/A | N/A | LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI |
| | Criterion 6 – Bird Species/Populations Occurring at Levels of International Importance: Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Redshank (passage) Shelduck, Golden Plover, Red Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit (overwintering) | Stage 1 Screening | LSE | LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | LSE | LSE | LSE | N/A | N/A | N/A | N/A | N/A | N/A | LSE | No LSE | No LSE |
| | | Stage 2 Appropriate Assessment | No AEOI | No AEOI | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | No AEOI | No AEOI |
| | Criterion 8 – Internationally important source of food for fishes, spawning grounds, nursery and/or migration path: River lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus*. | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | LSE | No LSE | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | LSE | No LSE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| Greater Wash SPA | A001 *Gavia stellata;* Red-throated diver (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A065 *Melanitta nigra*; Common scoter (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |

| Site | Qualifying features | HRA Stage | Physical loss of habitat and associated species (Section 4.3) | | | Physical damage through disturbance and/or smothering of habitat (Section 4.4) | | | Physical loss or damage of habitat through alterations in physical processes (Section 4.5) | | | Direct changes to qualifying habitats beneath marine infrastructure due to shading (Section 4.6) | | | Physical change to habitats resulting from the deposition of airborne pollutants (Section 4.7) | | | Non-toxic contamination through elevated suspended sediment concentrations (Section 4.8) | | | Toxic contamination through release of toxic contaminants bound in sediments, and accidental oil, fuel or chemical releases (Section 4.9) | | | Airborne noise and visual disturbance (Section 4.10) | | | Disturbance through underwater noise and vibration (Section 4.11) | | | Biological disturbance due to potential introduction and spread of non-native species (Section 4.12) | | | Changes to foraging and behaviour due to artificial lighting (Section 4.13) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D | C | O | D |
| | A177 *Hydrocoloeus minutus*; Little gull (Non-breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A191 *Sterna sandvicensis*; Sandwich tern (Breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A193 *Sterna hirundo*; Common tern (Breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| | A195 *Sternula albifrons*; Little tern (Breeding) | Stage 1 Screening | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | Stage 2 Appropriate Assessment | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| The Wash and North Norfolk Coast SAC | S1365 Harbour seal *Phoca vitulina* | Stage 1 Screening | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | N/A | No LSE | No LSE | No LSE | LSE | No LSE | N/A | N/A | N/A | N/A | No LSE | No LSE | No LSE |
| | | Stage 2 | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R | No AEOI | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |

# Appendix E: Mitigation Effectiveness Document

# Immingham Green Energy Terminal

## Shadow Habitats Regulations Assessment: Appendix E

Associated British Ports

July 2024

# Waterbird Mitigation Effectiveness Summary

This appendix summarises information on the potential effectiveness of the following proposed mitigation measures in reducing potential effects on waterbird features:

- Winter marine construction restriction (from 1 October to 31 March);
- Noise suppression system for piling;
- Acoustic barrier/ screening; and
- Soft starts for any piling.

## *Winter marine construction restriction (from 1 October to 31 March)*

### *Temporal extent effectiveness*

The mitigation is focused on the months when the largest numbers of SPA species occur i.e the winter months from October to March inclusive). Specifically, this period is when the largest numbers of Black-tailed Godwit have been observed on the foreshore in the area of the Project with abundances < 100 individuals recorded feeding (representing up to 2% of the estuary wide WeBS five year mean peak) in the last five years (2018/19 to 2022/23) during the IOH monitoring on the section of Sector C foreshore between the IOT Jetty and the mudflat fronting North Beck drain (within approximately 400-500m of the Project) (Section 1.4 of Appendix A). Wintering numbers of this qualifying SPA species are above the 1 % threshold used by Natural England to determine significant numbers[1]. However, numbers recorded feeding outside the winter months and roosting (year-round) have been lower than this 1 % threshold.

Other SPA qualifying and assemblage species (with the exception of Turnstone) have been recorded in the largest numbers during the winter months from October to March on the foreshore in the vicinity of the Project (i.e. within 400-500 m).(Section 1.4 of Appendix A), although in an estuary wide context, numbers are considered low (representing <1% of the estuary wide population numbers as described in **Table E.2**). This is below the 1 % threshold used by Natural England to determine potentially significant numbers. However, the proposed mitigation will also benefit these species as summarised in Table 27 of the Shadow HRA.

Turnstone (an SPA assemblage species) typically occurs year-round in locally or regionally important numbers (peak counts of approximately 20-30 birds in most months). However, this species is considered highly tolerant to disturbance (as highlighted in Table 26 of the Shadow HRA) with the measures described above also benefiting this species.

[1] Advice provided by Natural England is that birds exceeding 1 % of the estuary-wide WeBS five-year mean peak should be viewed as significant numbers. This is a threshold commonly applied by Natural England on the Humber Estuary, and one which has been specifically requested by Natural England to be applied for the Project, to determine whether there is the potential to adversely effect individual species.

It is also recognised that during the colder winter months, coastal waterbirds are particularly susceptible to effects of disturbance due to higher energetic costs and greater feeding requirements for thermoregulation along with a range of other factors highlighted in paragraph 4.10.28 of the Shadow HRA.

***Spatial extent and activities***

The mitigation measures apply a 200 m disturbance buffer, with no construction activity being undertaken on the foreshore or within 200 m of Mean Low Water Springs over the winter period (1 October to 31 March inclusive) until an acoustic barrier/visual screen has been installed on both sides of the semi-completed jetty structure. Therefore, with the implementation of this mitigation, piling and other marine construction activity in the winter months will be at least 200 m from intertidal habitat (and typically greater distances over most tidal phases). As highlighted in Section 4.10 and Table 26 of the Shadow HRA, evidence suggests that Black-tailed Godwit and Turnstone do not respond to human activity at distances of more than 200 m with responses of other waterbirds also limited at distances over 200 m, particularly in areas subject to already high levels of existing anthropogenic activity (as found in the Port of Immingham area). This evidence includes numerous scientific papers, site-specific bird disturbance monitoring, grey literature and anecdotal evidence from local ornithologists. Therefore, the buffer is considered precautionary based on the evidence presented.

The restriction will mean that piling cannot be undertaken within this zone over the winter. Piling is considered to have a high potential for disturbance (due to the high noise levels associated with this activity). In light of this, it is important to note that a noise suppression system will be used for piling undertaken out of the 200 m restriction zone. The noise suppression system is predicted to reduce noise levels to <70 dB LAmax at distances greater than approximately 200 m from the piling. Based on Natural England guidance *'peak levels below 55 dBA can be regarded as not significant, while peak noise levels approaching 70 dBA and greater are most likely to cause an adverse effect'.* On this basis, the noise suppression system will limit noise levels at distances of 200 m or more below this 70 dB level. On this basis, noise levels on the foreshore during the winter restriction period will be < 70 dB *LAmax*. This will be in the range of existing background noise levels on the foreshore (with noise levels of 65-70+ dB LAmax regularly occurring as a result of nearby operational port activities and other ambient noise sources). Local wintering waterbird populations are therefore subjected to noise at the level predicted to occur on the foreshore due to the piling (i.e., <70 dB LAmax) on a regular basis with observations from the ongoing ornithology surveys in the area recording limited responses with birds continuing to feed and roost, suggesting they are habituated to noise at these levels.

This restriction applies until an acoustic barrier/visual screen has been installed on both sides of the semi-completed structure. Construction activity will then be undertaken on the approach jetty itself, behind the screens, with no use of large heavy plant. With the addition of acoustic barriers, noise levels on the intertidal mudflat will be less than 70 dB(A) (which will also be in the range of existing background noise levels).

### *Noise suppression system for piling*

The noise suppression system is expected to offer a 10 dB reduction in the unmitigated LAmax sound power level associated with piling.

The noise suppression system will be used for piling undertaken outside of the 200 m restriction zone. The noise suppression system is predicted to reduce noise levels to <70 dB *LAmax* at distances greater than approximately 200 m from the marine piling which will be in the range of existing background noise levels of operational port activities (see Figure **E.1**). It should be noted that the green zone shown on Figure 1 corresponds to noise levels less than (but *not* equal to) 70 dB *LAmax*.

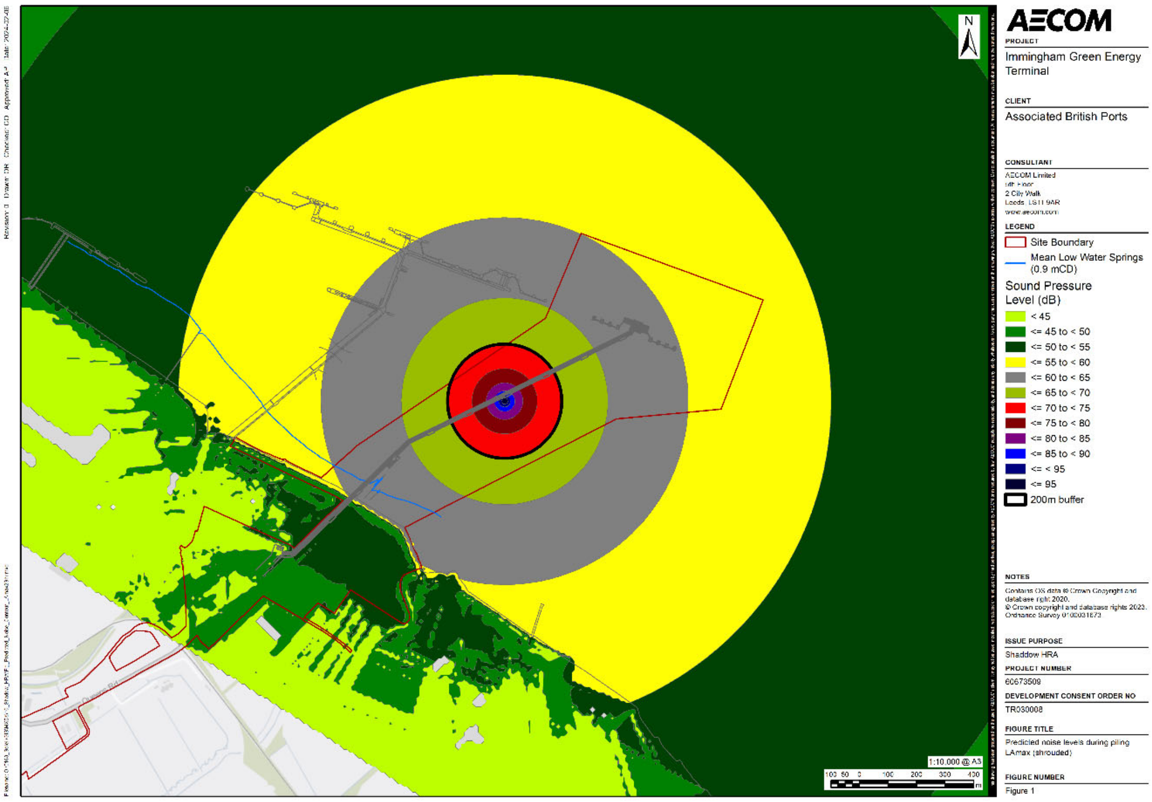


**Figure E.1. Predicted airborne noise (LAmax) during piling on the approach jetty pier noise suppression system**

### *Acoustic barrier/ screening*

Screens and other barriers are a widely used measure to help reduce potential disturbance to coastal waterbirds (Ikuta and Blumstein, 2003; Liley and Tyldesley, 2013; Hockin *et al.,* 1992) and have been successfully applied as mitigation to reduce disturbance at a number of port locations located near intertidal waterbird populations (GoBe Consultants Ltd, 2011, ABPmer, 2014; MMO, 2018).

### *Soft starts for any piling*

The application of soft start procedures for piling activities is a widely established measure to help reduce disturbance to waterbirds. It is acknowledged that initial sudden noise associated with an activity elicits a greater response than further subsequent noise (due to increasing tolerance of the birds to the stimuli) (Collop *et al*., 2016; IECS, 2009; Hockin *et al*., 1999). On this basis, soft starts will allow the more gradual increase in noise levels which would help reduce potential 'startling' effects to waterbird associated with the first sudden bangs of piling (during periods which are not subject to seasonal restrictions).

The use of soft starts is also an established mitigation measure to help reduce potential underwater noise effects on marine mammals and fish (Tougaard *et al.,* 2012).

### *Wider mitigation*

It is important to understand that the proposed restrictions and mitigation for overwintering coastal waterbirds (noted above) sit within a much wider package of mitigation measures for other receptors, including migratory fish and marine mammals that are sensitive to underwater noise and vibration. To address this issue, ABP has committed to a range of restrictions relating to the timing and duration of percussive piling. Together with the restrictions that are currently proposed for birds, the construction of IGET is already highly constrained as shown in Table E.2. Any further seasonal or timing restrictions could extend the overall construction period for the project. Given the complex and comprehensive nature of the overall mitigation measures, the addition of further restrictions is likely to have a disproportionate effect on the overall construction programme.

Overall, therefore, the proposed restrictions are considered appropriate and acceptable for the IGET project.

The justification for the mitigation measures proposed for migratory fish is set out in Section 9.9 (and the proceeding bullet points) of Chapter 9 of the ES [APP-051]. April and May, during which percussive piling is not allowed in the water column, coincides with the greatest number of different migratory fish in the Humber Estuary and also the vulnerable life stages of a number of species[2]. June, and August to October, during which there is a limit on the duration (i.e., number of hours) of piling that can be undertaken, coincides with silver eels, river lamprey and returning adult Atlantic salmon moving through the estuary.

The night-time piling restriction is proposed to protect the upstream migration of river lamprey which takes place almost exclusively at night, and there is also an increase in glass eel migratory activity during the night-time.

The level of protection for different species (including fish) is provided in paragraph 9.6.12 to 9.6.17 of Chapter 9 of the ES [APP-051]. This is also summarised Table E.1 below.

[2] Spring is the peak period when Atlantic salmon and sea trout smolts migrate downstream to the sea and it is also the peak migration period for European eel elvers moving into the estuary. In addition, it is the period when allis shad move into estuaries and when sea lamprey and twaite shad gather in estuaries and move up to spawn. It is also the period when the highest densities of smelt are present in the Humber Estuary.

**Table E.1. Protection afforded to fish species in the Humber Estuary**

| Fish Species | Protection |
|---|---|
| European eel | Eels (England and Wales) Regulations 2009, Natural Environment and Rural Communities (NERC) Act 2006 species of principle importance |
| Atlantic salmon | Annex II and V of the EC Habitats Directive, NERC species of principle importance |
| Sea lamprey and river lamprey | Annex II and V of the EC Habitats Directive, NERC species of principle importance |
| Twaite and allis shad | Annex II and V of the EC Habitats Directive, Wildlife and Countryside Act 1981, NERC species of principle importance |
| Brown / sea trout | NERC species of principle importance |
| European smelt | NERC species of principle importance, Marine Conservation Zone (MCZ) Feature of Conservation Interest (FOCI) |

With specific respect to the Humber Estuary, sea lamprey and river lamprey are qualifying features of the Humber Estuary SAC. However, given the level of protection afforded under all the other legislation, all migratory diadromous species are considered to be of high importance.

The proposed mitigation measures for both coastal waterbirds and migratory fish are considered appropriate and proportionate to the level of impact predicted to occur during construction of the Project. They are based on a detailed analysis of extensive survey data, scientific evidence, and a high level of experience studying bird responses to port activity. The measures are designed to reduce the impacts as far as reasonably practicable whilst also noting that the Project is a nationally significant infrastructure project which has to be delivered.

In terms of balancing the mitigation measures for birds and migratory fish, it is important to appreciate that in order to mitigate impacts on birds, all construction activity (not just piling) is prohibited within 200 m of Mean Low Water Springs(i.e., the area where birds are considered to be affected by the works) for half the year (October to March) until an acoustic barrier/visual screen has been installed on both sides of the semi-completed approach jetty. The piling reporting protocol restriction for migratory fish applies to percussive piling only, and percussive piling is only prohibited for two months of the year (April to May).

**Table E.2. Schedule of proposed seasonal restrictions on construction activity**

| Construction activity | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jetty head | | | ☼ sunrise to sunset | | ☼ sunrise to sunset | ☼ 07:00 to 19:00 | ☼ 07:00 to 19:00 | | | | | ☼ 07:00 to 19:00 |
| Approach jetty | Dry only | Dry only | ☼ sunrise to sunset | | ☼ sunrise to sunset | ☼ 07:00 to 19:00 | ☼ 07:00 to 19:00 >200 m | >200 m | >200 m | >200 m | >200 m | ☼ 07:00 to 19:00 >200 m |

Please note:

- This table does not include other proposed mitigation measures that apply year-round (e.g., soft starts, noise suppression system, cold weather restriction etc.).

| Key | Restriction detail | Receptor (relevant qualifying interest features in brackets) |
|---|---|---|
| | No restrictions – all construction activity allowed | N/A |
| ☼ | Night-time piling restriction – piling (percussive and vibro) not allowed between sunset and sunrise or 19:00 and 07:00 (the time of sunrise and sunset will be set in accordance with HM Nautical Almanac Office data) | Migratory fish (including river lamprey and sea lamprey which are qualifying features of the Humber Estuary SAC and Ramsar site) |
| | Piling reporting protocol:<br>• Reports detailing the total duration of piling each day are to be submitted to the MMO on a weekly basis and the Applicant will hold fortnightly meetings with the MMO (unless otherwise agreed with the MMO)<br>• A 60-minute contingency period is allowed as well as the 270 minutes per day maximum percussive pile driving scenario<br>• In the event of an abnormal situation arising which triggers the contingency period, an environmental representative for the works will be notified who will agree a plan with the contractor to limit the duration of percussive piling to 330 minutes for that day, as well as measures to prevent a future recurrence<br>• Circumstances that trigger the contingency period will be recorded and explained in the weekly reporting to the MMO – the Applicant proposes to use the fortnightly meeting to discuss and agree further corrective action with the MMO should it be required | Migratory fish (including river lamprey and sea lamprey which are qualifying features of the Humber Estuary SAC and Ramsar site) |
| | No piling of any kind | Migratory fish (including river lamprey and sea lamprey which are qualifying features of the Humber Estuary SAC and Ramsar site) |
| Dry only | No piling of any kind unless on dry intertidal areas outside of the waterbody at periods of low water | Migratory fish (including river lamprey and sea lamprey which are qualifying features of the Humber Estuary SAC and Ramsar site) |
| >200 m | Construction activity (including percussive and vibro piling) not allowed on the foreshore or within 200 m of Mean Low Water Springs.<br>Note:<br>• Construction can take place on seaward sections of approach jetty when works are >200 m from Mean Low Water Springs<br>• Restriction applies until an acoustic barrier/visual screen has been installed on both sides of the semi-completed structure<br>• With the addition of acoustic barriers, noise levels on the intertidal mudflat will be less than 70 dB(A) | Overwintering birds (including qualifying features of the Humber Estuary SPA and Ramsar site) |

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