Immingham Green Energy Terminal

TR030008

Volume 6

6.2 Environmental Statement

Chapter 10: Ornithology

Planning Act 2008

Regulation 5(2)(a)

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

September 2023

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

6.2 Environmental Statement

Chapter 10: Ornithology

Regulation Reference	APFP Regulation 5(2)(a)
Planning Inspectorate Case Reference	TR030008
Application Document Reference	TR030008/APP/6.2
Author	Associated British Ports Air Products BR

Version	**Date**	**Status of Version**
Revision 1	21 September 2023	DCO Application

Table of contents

Chapter Pages

Tables

10 Ornithology

10.1 Introduction

10.1.1 This chapter presents the findings of the assessment of the likely significant effects of the Project on Ornithology.

10.1.2 There may be interrelationships related to the potential effects on Ornithology and other disciplines. Therefore, also refer to the following chapters **[TR030008/APP/6.2]**:

a. **Chapter 7: Noise and Vibration.**

b. **Chapter 8: Nature Conservation (Terrestrial Ecology).**

c. **Chapter 9: Nature Conservation (Marine Ecology).**

d. **Chapter 16: Physical Processes.**

e. **Chapter 17: Marine Water and Sediment Quality.**

10.1.3 Relevant aspects of the ornithology assessment presented in this chapter have informed the **Water Framework Directive ("WFD") Compliance Assessment [TR030008/APP/6.4]** and the **Shadow Habitats Regulations Assessment ("HRA") [TR030008/APP/7.6]**.

10.1.4 This chapter is also supported by the following figures and appendices:

a. **Figure 10.1:** Monitoring locations of coastal waterbird surveys in the vicinity of the Project **[TR030008/APP/6.3]**.

b. **Figure 10.2:** Internationally and nationally designated conservation sites **[TR030008/APP/6.3]**.

c. **Figure 10.3:** The 5-year mean peak number of birds in Sector C during different winter months **[TR030008/APP/6.3]**.

d. **Figure 10.4:** The broad distribution of coastal waterbirds in Sector C **[TR030008/APP/6.3]**.

e. **Figure 10.5**: Predicted noise levels during marine piling **[TR030008/APP/6.3]**.

f. **Figure 10.6**: The potential disturbance buffer that has been applied to the assessment **[TR030008/APP/6.3]**.

g. **Appendix 10.A [TR030008/APP/6.4]:** Bird data for Sector C covering the period October 2021 to September 2022 and a summary of surveys undertaken on terrestrial land within the proposed development footprint to understand the potential for supporting coastal waterbird species.

10.2 Consultation and Engagement

10.2.1 A scoping exercise was undertaken in August 2022 to establish the form and nature of the Ornithology assessment, and the approach and methods to be followed. The Scoping Report (**Appendix 1.A [TR030008/APP/6.4]**) 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 ornithology. A Scoping Opinion was adopted by the Secretary of State on 10 October 2022 **[TR030008/APP/6.4]**.

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

10.2.3 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 2008 Act and a PEI Report Addendum was publicised to support the consultation.

10.2.4 The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal scoping opinion (**Appendix 1.A [TR030008/APP/6.4]**) and in response to the formal consultation and other pre-application engagement is summarised in **Table 10-1.** The full responses to consultation comments are included within the Summary of Consultation Responses document **[TR030008/APP/5.1]**.

Table 10-1: Consultation summary table

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
Scoping Report August 2022	Planning Inspectorate	The Scoping Report proposes to scope out this matter [direct changes to waterbird bird foraging habitat as a result of the capital dredge and dredge disposal] as the dredge and disposal sites do not overlap the intertidal area and the seabed habitat is already highly dynamic and not known to support large populations of diving birds/ seabirds. The Inspectorate agrees this matter can be scoped out of the assessment given the low value of the habitat as a prey resource.	Scoping opinion noted.
Scoping Report August 2022		In the absence of agreement with Natural England, the Inspectorate does not agree that this matter [Indirect changes to intertidal feeding and roosting habitat as a result of the capital dredging] should be scoped out of the assessment because insufficient information has been provided to conclude that no significant effects would result from the scale of predicted changes on intertidal habitats. Evidence on this should be provided in the ES to demonstrate that there will be no likely adverse significant effects.	Noted. This pathway has been scoped into the assessment.
Scoping Report August 2022		The Scoping Report states that the resuspension of sediment onto the seabed as result of piling is expected to be negligible and benthic habitats and species are not expected to be sensitive to this level of change. The Inspectorate agrees that there is unlikely to be an effect on coastal waterbird habitat and prey resources and this matter [changes to seabed habitats and species as a result of sediment deposition during piling] can therefore be scoped out of the assessment.	Scoping opinion noted.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
Scoping Report August 2022		The Scoping Report states that the presence of the piled structures has the potential to result in changes to hydrodynamic and sedimentary processes but this is anticipated to be negligible and highly localised and marine habitats and species are not expected to be sensitive to this level of change. The Inspectorate does not agree to scope out this matter [indirect changes to seabed habitats and species as a result of changes to hydrodynamic and sedimentary processes due to the presence of the piles] from the assessment until the physical processes assessment and other evidence provides sufficient evidence that there will be no significant adverse effects on marine habitats and species.	Noted. This pathway has been scoped into the assessment.
Scoping Report August 2022		The Scoping Report states that during capital dredging and dredge disposal, there is potential for the dredging vessel to cause noise and visual disturbance for bird populations but that the area is subject to high levels of vessel movements from the regular disposal of maintenance dredge arisings and shipping and that any potential disturbance stimuli caused by the capital dredge disposal would be highly temporary and localised. The Scoping Report adds that these areas are also not known to support large populations of diving birds/ seabirds. The Inspectorate does not agree this matter [noise and visual disturbance during capital dredge disposal] should be scoped from the assessment because there is insufficient evidence to conclude that the additional noise and visual disturbance would not have a significant adverse effect	Additional evidence and literature has been used to inform the assessment within this chapter and the pathway has been scoped out based on this additional information (**Table 10-17**).

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		on bird species because of noise and visual disturbance during capital dredge disposal.	
Scoping Report August 2022	Natural England	Bird survey data is required which covers the full period when significant numbers of birds are likely to be using the site, in order to inform a thorough assessment of the potential impacts of the development. As the surveys which relate to Immingham Outer Harbour cover the period October to March this will not cover the passage periods, in particular, we know that the Autumn passage period (August and September) is likely to be significant for SPA birds in this part of the estuary. In addition, bird data will be required which covers the low tide period as well as the high tide period, in order to have sufficient data to assess the construction and operational effects of the Project. It is not currently clear if this is the case for the data from Immingham Outer Harbour. Therefore additional bird surveys are likely to be required which cover the passage periods (particularly August and September) and potentially the low tide period.	Terrestrial waterbird survey scope covers the passage period, with surveys being undertaken twice monthly at High Water between September 2022 and March 2023 inclusive. 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 five-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. Surveys are therefore undertaken during both high and low water periods with data available for both winter and passage months.
Scoping Report August 2022		Changes to intertidal feeding and roosting habitat at whatever scale need to be quantified, Natural England seek clarification on the justification for scoping this impact out of EIA. Additional noise will disturb local bird populations. Natural England have not seen the bird surveys mentioned in para 9.3.3 of the scoping report but these along with additional surveys programmed will indicate the level of disturbance on notified bird populations.	Noted. All potential pathways relating to intertidal habitat loss or change have been scoped into the assessment.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
Scoping Report August 2022		Per section 9.4.7 of the scoping report, [Operation - pathways scoped out].- Natural England seeks clarification on this comment ['No pathways during the operational phase are proposed to be scoped out of the EIA'], does this mean that all impacts scoped in during the construction phase are also scoped in during the operational phase?	Only the pathways that are scoped in under operation will be considered. No other relevant pathways have been identified.
Scoping Report August 2022		Again Natural England welcome the commitment to consult all statutory bodies.	Noted.
Statutory Consultation January 2023	Natural England	**Chapter 10: Ornithology** **Potential Impacts on Greater Wash SPA** 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	**Key points in relation to Humber Estuary SPA/ Ramsar birds** 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	1). Noted. 2). Relevant tables and figures have been updated (including winter 2022/23 data) within this chapter. The source of the data has been highlighted in the respective tables or figures. In addition, **Appendix 10.A [TR030008/APP/6.3]** includes both winter and passage months so counts through the year are presented. 3). More detailed assessment based on the data has been undertaken including identifying those months that have significant numbers of Special Protection Areas ("SPA")/ Ramsar species (over 1% of the latest estuary-wide Wetland Bird Survey ("WeBS") five-year mean peak).

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		for terrestrial fields adjacent to the Humber Estuary to assess their value as functionally linked land. • 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. • 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) • More information about mitigation measures will be required if significant numbers of birds are recorded. The 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. • 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 HRA) and through engagement with statutory authorities. These are provided in **Section 10.9.** 5). Noted.
	Natural England	**Natural England's response refers to the following tables:**	Noted.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		Table 10.10 Potential effects during construction scoped in/ out of further detailed assessment In terms of construction impacts, we consider that this table equates to the likely significant effect test in the 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.	
	Natural England	**Table 10.11 Potential effects during operation scoped in/ out of further detailed assessment (berth operations during operation phase)** The following impacts have been screened in for further assessment and Natural England supports this approach. • Direct changes to intertidal foraging and roosting habitat as a result of marine infrastructure footprint. • Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats. • Airborne noise and visual disturbance to waterbirds using terrestrial habitats. 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	Noted.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		assessments once the additional information is available.	
	Natural England	**Table 10.12 Summary of potential impact, mitigation, and residual effects** We cannot comment on this table until all the bird data is available, the HRA has been carried out and we better understand the expected impacts and what mitigation measures are required.	Noted.
	Natural England	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: 1) Disturbance to birds during construction in the marine environment (Table 10.10) 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 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 in **Section 10.8**), 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). The assessment has also been based on Natural England advice provided as part of the consultation for the nearby 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 noise above 50 dBA should be avoided'*. It should be noted that noise modelling of marine piling (i.e. in subtidal and intertidal) predicts that noise levels will be lower than 70 dBA at distances of more than 200m away with the use of a noise suppression system and also 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

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
			results and as part of the assessment process (including the HRA) and through engagement with statutory authorities. These are provided in **Section 10.9**.
	Natural England	3) Disturbance to birds during operation in the marine environment (Table 10.11) 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. More detailed information has been provided on bird numbers in proximity to the new port infrastructure (**Section 10.8**).
	Natural England	4) Disturbance to birds during operation in terrestrial environment (Table 10.11) 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. 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	This chapter has considered the other fields as part of the Project and the effects of the tree works on the screening function has also been considered. This is covered in **Section 10.8**. Wintering bird surveys have not recorded any SPA/ Ramsar species in terrestrial habitats >1% of the Humber Estuary populations, and therefore no land within the terrestrial part of the Site meets the threshold for functionally linked land.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		development, the effect of the tree works on the screening function needs to be considered.	
	Natural England	5) Loss of supporting marine habitat for SPA/ Ramsar birds (Table 10.10) 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 HRA. Changes to intertidal habitat from berth operation and infrastructure effects have been screened in for further assessment, Natural England supports this approach. The HRA should consider whether the same numbers and species of SPA/ Ramsar waterbirds are likely to use the site post construction. No mitigation measures have been proposed so far, however the requirement for mitigation measures will be determined through the HRA process.	Capital dredge and dredge disposal have been considered in the **Shadow HRA [TR030008/APP/7.6]** in context of supporting habitat for SPA/ Ramsar birds. Changes to waterbird habitat as a result of infrastructure has been considered in the **Shadow HRA [TR030008/APP/7.6].**
		6) Loss of supporting terrestrial habitat for SPA/ Ramsar birds (Table 10.10) 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 HRA should indicate the period over which the terrestrial habitat will be unavailable due to construction compounds and other uses. Natural England has been working with North East Lincolnshire Council and other estuary stakeholders for many years to deliver a strategic approach to mitigation	Wintering bird surveys undertaken in 2022/23 have not recorded any SPA/Ramsar waterbird species in numbers >1% of the Humber Estuary populations in terrestrial habitats, and therefore no land meets the threshold for functionally linked land **(Paragraphs 10.6.42 – 10.6.44**). This pathway has therefore been scoped out of the impact assessment in this Chapter and is also screened out of the **Shadow HRA [TR030008/APP/7.6]** at the Likely Significant Effects ("LSE") screening stage. Policy 9 therefore does not apply to this Project.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		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. 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).	
Pre-application meeting, 23 November 2022.	Natural England	The meeting provided an update of the IGET project, a summary of the future site-specific surveys and a high-level discussion of potential effects.	This chapter and the **Shadow HRA** (**[TR030008/APP/7.6]**) have been completed taking on board consultee comments from the meeting.
Pre-application meeting, 11 January 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.	This chapter and the **Shadow HRA** (**[TR030008/APP/7.6]**) have been completed taking on board consultee comments from the meeting.
Pre-application meeting, 01 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.	This chapter and the **Shadow HRA ([TR030008/APP/7.6])** have been completed taking on board consultee comments from the meeting.
Second Statutory Consultation	Natural England	**Internationally and nationally designated sites**	A **Shadow HRA** has been produced **[TR030008/APP/7.6]** which considers potential effects on the Humber Estuary SAC, SPA and Ramsar site.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		Natural England notes there have been no amendments to the PEIR Appendix 9C which was provided in the first S42 consultation. 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). 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. 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. 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	Marine ecology features of Humber Estuary Site of Special Scientific Interest ("SSSI") are considered in Section 9.8 of **Chapter 9: Nature Conservation (Marine Ecology) [TR030008/APP/6.2]** and ornithology features of the SSSIin **Section 10.8** of this chapter. Potential effects on the North Killingholme Haven Pits SSSI are considered in**Section 10.8** of this chapter.

Reference/date	Consultee	Summary of Response	How comments have been addressed in this chapter
		significant effect on any European site, proceeding to the Appropriate Assessment stage where significant effects cannot be ruled out.	

10.2.5 Having regard to the information presented within the Scoping Report (**Appendix 1.A [TR030008/APP/6.4]**), the Planning Inspectorate's Scoping Opinion (**Appendix 1.B [TR030008/APP/6.4]**) has also confirmed the Applicant's view that significant effects on waterbird foraging habitat from dredging and disposal activities; and seabed habitats and species as a result of sediment deposition during marine piling are unlikely. Accordingly, these matters have remained scoped out of consideration in the Environmental Statement ("ES").

10.3 Legislation, Policy and Guidance

10.3.1 **Table 10-2** presents the legislation, policy and guidance relevant to the Ornithology assessment and details how their requirements will be met.

Table 10-2: Relevant legislation, policy and guidance regarding Ornithology

Legislation/Policy/Guidance	Consideration within the ES
Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ('The Habitats Directive') (Ref 10-4)	
The Habitats Directive (92/43/EEC) is intended to help maintain biodiversity throughout the EU Member States by defining a common framework for the conservation of wild plants, animals and habitats of community interest. It established a network of Special Areas of Conservation ("SAC") designated by Member States to conserve habitats and species (listed in Annexes I and II).	The Humber Estuary SAC and features are described in **Section 10.6**. Consideration of impacts on SAC habitats and potential indirect impacts on coastal waterbirds is provided in **Section 10.8**. A **Shadow Habitats Regulations Assessment [TR030008/APP/7.6]** has been produced.
Council Directive 2009/147/EC on the conservation of wild birds ('The Birds Directive') (Ref 10-5)	
Directive 2009/147/EC on the conservation of wild birds is known as the 'Birds Directive'. It creates a comprehensive scheme of protection for all wild bird species. The Directive recognises that habitat loss and degradation are the most serious threats to the conservation of wild birds. It, therefore, places great emphasis on the protection of habitats for endangered as well as migratory species (listed in Annex I), especially through the establishment of a coherent network of Special Protection Areas ("SPAs") comprising all the most suitable territories for these species.	The Humber Estuary SPA and qualifying features are described in **Section 10.6**. Consideration of impacts on coastal waterbirds which are features of the SPA are outlined in **Section 10.8**. A **Shadow Habitats Regulations Assessment [TR030008/APP/7.6]** has been produced.
Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. (Ref 10-6)	
The Water Framework Directive (2000/60/EEC) ("WFD") establishes a framework for the management and protection of Europe's water resources. The overall objectives of the WFD is to achieve *"good ecological and good chemical status*" in all	The Project (and associated disposal sites) is located within the Humber Lower water body (ID: GB530402609201) (further described in **Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2]**). A **WFD Compliance Assessment [TR030008/APP/6.4]** has been

Legislation/Policy/Guidance	Consideration within the ES
inland and coastal waters by 2021 unless alternative objectives are set or there are grounds for time limited derogation. For example, where pressures preclude the achievement of good status (e.g. navigation, coastal defence) in heavily modified water bodies ("HMWB"s), the WFD provides that an alternative objective of "good ecological potential" is set.	prepared to support the Development Consent Order ("DCO") application.
Conservation of Habitats and Species Regulations 2017 as amended ('The Habitats Regulations') (Ref 10-7)	
The Habitats Directive and Birds Directive are transposed into UK law through the Conservation of Habitats and Species Regulations 2017 as amended, known as the "Habitats Regulations"[1]. The Habitats Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species' and the adaptation of planning and other controls for the protection of European Sites. The Regulations also require the compilation and maintenance of a register of European sites, to include SACs (classified under the Habitats Directive) and SPAs (classified under the Birds Directive). These sites form the Natura 2000 network. These regulations also apply to Ramsar sites (designated under the 1971 Ramsar Convention for their internationally important wetlands), candidate SACs ("cSAC"), potential Special Protection Areas ("pSPA"), and proposed and existing European offshore marine sites.	**Section 10.6** identifies protected coastal waterbird species. Consideration of impacts on these receptors are described in **Section 10.8**. Information to support a **Shadow HRA [TR030008/APP/7.6]** has been produced. This report will inform the consultation process and will aid the Competent Authority[2] in determining whether the Project would give rise to a LSE on the interest features and/or supporting habitat of a European/Ramsar site either alone or in-combination with other plans, projects and activities and, if so, will inform the requirement to undertake an Appropriate Assessment ("AA") and the completion of the AA of the implications of the proposals in light of the site's conservation objectives.
Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 as amended (Ref 10-9)	
The Water Framework Directive (2000/60/EEC) is transposed into UK law through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 as amended, known as the Water Framework Regulations[3].	The Project (and associated disposal sites) is located within the Humber Lower water body (ID: GB530402609201) (further described in **Chapter 17: Marine Water and Sediment Quality)**. A **WFD Compliance Assessment [TR030008/APP/6.4]** has been prepared to support the DCO application.

1 Following the UK leaving the EU, the Conservation of Habitats and Species Regulations 2017 have been modified by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. Available at: https://www.legislation.gov.uk/uksi/2019/579/contents/made (accessed October 2021) (Ref 10-8).

2 The Secretary of State is the Competent Authority for the HRA for the DCO Application under the UK Habitats Regulations.

3 Following the UK leaving the EU, the main provisions of the WFD have been retained in English law through The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (Ref 10-11).

Legislation/Policy/Guidance	Consideration within the ES
Marine and Coastal Access Act 2009 ("MCAA") (Ref 10-10)	
The MCAA provides the legal mechanism to help ensure clean, healthy, safe, productive, and biologically diverse oceans and seas by putting in place a new system for improved management and protection of the marine and coastal environment. The MCAA established the Marine Management Organisation ("MMO") as the organisation responsible for marine planning and licensing. The Project will require a Marine Licence for the elements of the works below Mean High Water Springs including dredging, disposal and placing or removing objects on or from the seabed. For Nationally Significant Infrastructure Projects ("NSIPs") the DCO where granted may include provision deeming a marine licence to have been issued under Part 4 of the Marine and Coastal Access Act 2009. The MMO is responsible for enforcing, post-consent monitoring, varying, suspending, and revoking any deemed marine licence(s) as part of the DCO.	Information relevant to the marine licensing process is provided in the ES including characterisation of the ornithology baseline (**Section 10.6**) and an assessment of impacts (**Section 10.8**).
The Planning Act 2008 ("2008 Act") (Ref 10-12)	
Whilst the MCAA regulates marine licensing for works at sea, section 149A of the Planning Act 2008 enables an applicant for a DCO to include within the Order a Marine Licence which is deemed to be granted under the provisions of the MCAA.	Information relevant to the marine licensing process is provided in the ES including characterisation of the ornithology baseline (**Section 10.6**) and an assessment of impacts (**Section 10.8**).
The Wildlife and Countryside Act 1981 ("WCA") (Ref 10-13)	
The WCA is the principal mechanism for the legislative protection of wildlife in Great Britain. The WCA is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention), the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), the Birds Directive (79/409/EEC) and the Natural Habitats and Wild Fauna and Flora Directive (92/43/FFC) are implemented in Great Britain. The WCA applies to the terrestrial environment and inshore waters (0 to 12 nautical miles) and concerns the protection of wild animals and the designation of protected areas, including SSSIs.	**Section 10.6** identifies coastal waterbird species and supporting habitats which are protected under the WCA. Consideration of impacts on these receptors is provided in **Section 10.8**.

Legislation/Policy/Guidance	Consideration within the ES
The Countryside and Rights of Way Act 2000 ("CroW Act") (Ref 10-14)	
The CroW Act applies to England and Wales only. Part III of the CroW Act deals specifically with wildlife protection and nature conservation. The CroW Act places a duty on the Government to have regard for the conservation of biodiversity and maintain lists of species and habitats for which conservation steps should be taken or promoted, in accordance with the Convention on Biological Diversity. Schedule 9 of the CroW Act amends the SSSI provisions of the WCA, including increased powers for the protection and management of SSSIs. The provisions extend powers for entering into management agreements; place a duty on public bodies to further the conservation and enhancement of SSSIs; increase penalties on conviction where the provisions are breached; and include an offence whereby third parties can be convicted for damaging SSSIs.	Consideration of impacts on coastal waterbird species and assemblages, for which SSSIs have been designated, are presented in **Section 10.8**.
Natural Environment and Rural Communities Act 2006 ("NERC Act") (Ref 10-15)	
The NERC Act came into force in October 2006. In addition to establishing Natural England ("NE") as the body responsible for conserving, enhancing, and managing England's natural environment, the Act also made amendments to both the Wildlife and Countryside Act 1981 and the CroW Act 2000. For example, it extended the CroW Act's biodiversity duty to public bodies and statutory undertakers, and altered enforcement powers in connection with wildlife prosecution. In addition to this, the NERC Act contains a number of additional measures designed to help streamline delivery and simplify the legislative framework, such as changes to the remit and constitution of the Joint Nature Conservation Committee ("JNCC"), reconstitution of the Inland Waterways Amenity Advisory Council, and improving the governance arrangements for the National Parks. Section 41 of the NERC Act requires the SoS to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with NE, as required by the NERC Act.	Consideration of impacts to coastal waterbird species and supporting habitats which are protected under the NERC Act (priority species and habitats of principal importance) are presented in **Section 10.8**.

Legislation/Policy/Guidance	Consideration within the ES
National Policy Statement for Ports ("NPSfP") (Ref 10-16)	
The National Policy Statement for Ports provides the framework for decisions on proposals for new harbour facility developments that constitute an NSIP. This policy requires that in order to meet the requirements of the Government's policies on sustainable development, new port infrastructure should also, amongst other things, preserve, protect and where possible improve marine and terrestrial biodiversity, be adapted to the impacts of climate change and provide high standards of protection for the natural environment. As highlighted in paragraphs 5.1.4 and 5.1.5 of the NPSfP, where the development is subject to Environmental Impact Assessment ("EIA"), the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. As highlighted in paragraphs 5.1.8 and 5.1.9 of the NPSfP, developments should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives. They should also ensure that appropriate weight is attached to designated sites of international, national and local importance.	Consideration of impacts to coastal waterbird species and supporting habitats including those which are features of internationally, nationally and locally designated sites of ecological importance are presented in **Section 10.8**. Where appropriate, mitigation has been included and this is outlined in **Section 10.7** and **10.9**.
UK Marine Policy Statement (Ref 10-17)	
The UK Marine Policy Statement ("MPS") is the framework for preparing marine plans and taking decisions affecting the marine environment. The MPS also sets out the general environmental, social and economic considerations that need to be taken into account in marine planning and provides guidance on the pressures and impacts that decision makers need to consider when planning for and permitting development in the UK marine areas. Paragraphs 3.1.7 and 3.1.8 of the MPS are relevant to the ecology assessment of the Project which, amongst other things, state that: *"Marine plan authorities and decision makers should take account of how developments will impact on the aim to halt biodiversity loss and the legal obligations relating to all MPAs, their*	Consideration of impacts to coastal waterbird species and supporting habitats including those which are features of Marine Protection Areas ("MPAs") are presented in **Section 10.8**.

Legislation/Policy/Guidance	Consideration within the ES
conservation objectives, and their management arrangements…" Marine plan authorities and decision-makers should take account of the regime for MPAs and comply with obligations imposed in respect of them. This includes the obligation to ensure that the exercise of certain functions contribute to, or at least do not hinder, the achievement of the objectives of a Marine Conservation Zone ("MCZ"). This would also include the obligations in relevant legislation relating to SSSIs and sites designated under the Birds and Habitats Directives.	
East Inshore and East Offshore Marine Plans (Ref 10-18)	
The East Inshore and East Offshore Marine Plans, which are collectively referred to as 'the East Marine Plans', were formally adopted on 2 April 2014. There are four policies within the East Marine Plans specifically related to nature conservation and ornithology.	Provides general guidance. See considerations of specific policies below.
Policy ECO1 - Cumulative impacts affecting the ecosystem of the East Marine Plans and adjacent areas (marine, terrestrial) should be addressed in decision-making and plan implementation:	Information on the cumulative and in-combination effects assessment for the Project are included in **Chapter 25: Cumulative and In-Combination Effects [TR030008/APP/6.2]**.
Policy BIO1 - Appropriate weight should be attached to biodiversity, reflecting the need to protect biodiversity as a whole, taking account of the best available evidence on those habitats and species that are protected or of conservation concern in the East Marine Plans and adjacent areas (marine, terrestrial).	Consideration of impacts to coastal waterbird species and supporting habitats are presented in **Section 10.8**.
Policy BIO2 **-** Where appropriate, proposals for development should incorporate features that enhance biodiversity and geological interests.	Consideration of design, mitigation and enhancement measures is outlined in **Section 10.7** and **10.9**.
Policy MPA1 - Any impacts on the overall MPA network must be taken into account in strategic level measures and assessments, with due regard given to any current agreed advice on an ecologically coherent network:	Consideration of impacts to coastal waterbird species and supporting habitats are presented in **Section 10.8**. A **Shadow Habitats Regulations Assessment** has been produced **[TR030008/APP/7.6]**). MCZs are considered in **Chapter 9: Nature Conservation (Marine Ecology) [TR030008/APP/6.2]**.
North East Lincolnshire Local Plan 2013 to 2032 (Ref 10-19)	
The North East Lincolnshire Local Plan was adopted in 2018 and covers the period 2013 to 2032. Policy 7 of the plan highlights that for	Consideration of impacts to coastal waterbird species and supporting habitats and designated sites are presented in **Section 10.8**. A **Shadow**

Legislation/Policy/Guidance	Consideration within the ES
operational port areas *"proposals for port related use will be supported and, where appropriate, approved by the Council if the submitted scheme accords with the development plan as a whole and subject to the ability to satisfy the requirements of the Habitats Regulations."* In addition, Policy 41 of the plan states that: *"The Council will have regard to biodiversity and geodiversity when considering development proposals, seeking specifically to:* *A. establish and secure appropriate management of long-term mitigation areas within the Estuary Employment Zone, managed specifically to protect the integrity of the internationally important biodiversity sites (see Policy 9 'Habitat Mitigation - South Humber Bank');* *B. designate Local Wildlife Sites (LWSs) and Local Geological Sites (LGSs) in recognition of particular wildlife and geological value;* *C. protect manage and enhance international, national and local sites of biological and geological conservation importance, having regard to the hierarchy of designated sites, and the need for appropriate buffer zones;* *D. minimise the loss of biodiversity features, or where loss is unavoidable and justified ensure appropriate mitigation and compensation measures are provided;* *E. create opportunities to retain, protect, restore and enhance features of biodiversity value, including priority habitats and species; and,* *F. take opportunities to retain, protect and restore the connectivity between components of the Borough's ecological network.* *Any development which would, either individually or cumulatively, result in significant harm to biodiversity which cannot be avoided, adequately mitigated or as a last resort compensated for, will be refused".* Policy 9 has been specifically developed to provide a method by which strategic mitigation can be delivered within the region for the loss of functionally linked land (i.e. terrestrial land outside the boundary of the Humber Estuary SPA/ Ramsar but which provides an important high tide feeding, roosting and loafing resource to support wintering waterbirds within the SPA/ Ramsar). Where development within the Mitigation Zone	**Habitats Regulation Assessment [TR030008/APP/7.6]** has been produced. Policy 9 does not apply to the Project given that no functionally linked land has been identified within the Site boundary.

Legislation/Policy/Guidance	Consideration within the ES
identified on the Policies Map results in the loss of functionally linked land, payment can be made (using the calculation within the Local Plan document) into the North East Lincolnshire South Humber Gateway Ecological Mitigation Delivery Plan.	

10.4 Assessment Methodology

10.4.1 To facilitate the impact assessment process and ensure consistency in the approach to assessing significance, a standard assessment methodology has been applied to determine the significance of effects within this chapter. This methodology has been developed from a range of sources, including relevant EIA Regulations, the EIA Directive (2014/52/EU), statutory and non-statutory guidance, consultations and professional project experience. The assessment also follows the principles of relevant guidance, including the latest guidelines from the Institute of Environmental Management and Assessment ("IEMA") (Ref 10-2), and the Chartered Institute of Ecology and Environmental Management ("CIEEM") guidelines for ecological impact assessment in the UK and Ireland (which combine advice for terrestrial, freshwater and coastal environments) (Ref 10-3). The methodology adopted is considered to be 'best practice'.

10.4.2 The environmental issues have been divided into distinct 'receiving environments' or 'receptors'. The effect of the Project on each of these has been assessed by describing in turn:

a. The baseline environmental conditions of each receiving environment or receptor.

b. The 'impact pathways' by which those receptors could be affected.

c. The significance of the effect occurring as a result of the impact.

d. The measures to mitigate for significant adverse effects where these are predicted.

10.4.3 In accordance with CIEEM (Ref 10-3), an impact is defined as an action resulting in changes to an ecological feature (e.g., construction activities resulting in the direct loss of intertidal habitat) and an effect is the outcome to an ecological feature from an impact (e.g., the effects on waterbirds from the loss of intertidal habitat).

Magnitude of impacts

10.4.4 The first stage in the assessment of impact involves understanding the impact magnitude which is determined by predicting the scale of any potential change in baseline conditions.

10.4.5 Magnitude of change needs to be considered in spatial and temporal terms (including duration, frequency and seasonality), and against background environmental conditions in a study area. The assessment of magnitude should also be carried out taking account of any embedded and standard design mitigation.

10.4.6 The following criteria have been used to assess the magnitude of impact **(Table 10-6)**:

a. Negligible: Changes that are barely discernible from existing baseline conditions.

b. Small: Relatively localised changes that are often temporary in nature and/or a receptor has limited exposure to change.

c. Medium: Receptors are subject to changes that occur over a large spatial area, but the effects are considered temporary.

d. Large: Receptors are subject to changes over a large spatial area with effects that are considered permanent/long-term duration.

10.4.7 Once a magnitude has been assessed, this is then considered in terms of the probability of occurrence (i.e., likelihood that the impact will occur) to derive an overall level of exposure to change.

Sensitivity of receptors

10.4.8 Sensitivity can be described as the intolerance of a habitat, community or individual of a species to an environmental change and essentially considers the response characteristic of the feature. The sensitivity of a marine habitat or species is considered to be a product of the following (Ref 10-80):

a. The likelihood of damage (termed intolerance or resistance) due to a pressure. This could include behavioural effects, physiological damage or even mortality of individuals or populations.

b. The rate of (or time taken for) recovery (termed recoverability, or resilience) of marine species once the pressure has abated or been removed.

10.4.9 The following criteria have been used to assess sensitivity:

a. Low: Pressures in which the likelihood of damage to individuals or populations is low with recoverability expected to occur over short timescales.

b. Moderate: Pressures in which damage to individuals or populations could occur but recoverability is expected to occur over short to moderate timescales.

c. High: Pressures in which damage to individuals or populations is highly likely with either no recoverability or recoverability expected to occur over longer timescales.

10.4.10 **Table 10-3** summarises the sensitivity level that has been assigned to different receptors considered in this assessment based on consideration of the criteria highlighted above. Further rationale for the sensitivity levels that have been assigned are included for each pathway in the impact assessment.

Table 10-3: Assessed sensitivity of ornithology receptors

Receptor	Sensitivity
Coastal waterbirds	Coastal waterbirds are generally considered to have a **low** sensitivity to marine habitat change/loss on the scale predicted for the Project (due to the high mobility of the species in the study area). The species in the study area are considered to have a **low to high** sensitivity to noise and visual disturbance (depending on the species) and **moderate** sensitivity to changes in feeding and roosting habitat as a result of the presence of marine infrastructure on the scale predicted.

Receptor importance

10.4.11 In considering the magnitude of impacts and sensitivity of the receptor, it is also necessary to identify whether an ecological feature is 'important'. As such, where possible, habitats, species and their populations have been valued on the basis of a combination of their conservation status, rarity and ecological/socioeconomic value using contextual information.

10.4.12 The CIEEM (Ref 10-3) guidelines recognise that determining ecological importance is a complex process, which is a matter of professional judgement guided by the importance and relevance of a number of factors. These include designation and legislative protection as well as biodiversity value and secondary/supporting value (e.g. where habitats may function as a buffer or resource associated with an adjacent designated area).

10.4.13 The importance of each ecological receptor has been determined, based on the following criteria:

a. Low: The receptor is neither protected nor designated and is considered to be of low to moderate biodiversity or supporting value.

b. Medium: Statutory protection/designation is afforded to a receptor but it is considered to be of low to moderate biodiversity/supporting value or the receptor does not receive statutory protection but is considered to be of high biodiversity or supporting value.

c. High: Statutory protection/designation is afforded to a receptor and the receptor is considered to be of high biodiversity or supporting value.

10.4.14 The importance of a receptor has also been considered with regard to the marine geographic frame of reference defined below as recommended in the CIEEM (Ref 10-3) guidelines:

a. International and European

b. National

c. Regional (Humber Estuary)

d. Local (Port of Immingham area).

10.4.15 **Table 10-4** summarises the importance level that has been assigned to the different receptors that have been assessed based on the criteria highlighted above.

Table 10-4: Assessment of the importance of ornithology receptors

Receptor	Importance
Coastal waterbirds	**High** (international) importance: All species are of conservation interest and protected.

Significance criteria

10.4.16 Determination of the significance of the predicted ecological effects is based on professional judgement having regard to the positive (beneficial) or negative (adverse) nature of a potential impact.

10.4.17 In summary, to assess the significance of effects, the magnitude of the impact pathway and the probability of it occurring is evaluated to understand the exposure to change. This is then assessed against the sensitivity of a receptor/ feature to understand its vulnerability. Finally, this is considered in the context of the importance of a receptor/feature to generate a level of significance for effects resulting from each impact pathway.

10.4.18 The CIEEM (Ref 10-3) guidelines state that an effect should be determined as being significant when it "*either supports or undermines biodiversity conservation objectives for important ecological features"*. This guidance relates to the weight that should be afforded to effects when decisions are made, and to the consequences, in terms of legislation, policy and / or development control. A significant adverse effect on a feature of importance (as defined in **Table 10-4** would, therefore, be likely to generate the need for development control mechanisms, such as DCO Protective Provisions or Requirements.

10.4.19 Whilst this assessment adopts an Ecological Impact Assessment ("EcIA") approach and, therefore, expresses the significance of ecological effects with reference to a geographic frame of reference (as advocated in the CIEEM Guidelines, Ref 10-3), significance is also expressed using generic EIA significance criteria. The generic criteria used throughout this report is based on an expression of severity, to describe the significance of environmental impacts. For ease of reference, **Table 10-5** provides a means of relating the two approaches and is provided in order to allow the EcIA to be integrated into the wider EIA framework without compromising the CIEEM best practice approach.

10.4.20 To ensure transparency in the impact assessment, it is important to make clear the evidence-based or value-based judgments used at each stage of the assessment and how they have been attributed a level of significance. This is presented in the impact assessment for each impact pathway.

10.4.21 Following the significance assessment, a confidence assessment was undertaken which recognises the degree of interpretation and professional judgement applied. This is presented in the summary table contained within the conclusions section of this chapter (**Section 10.11**). Confidence was assessed on a scale incorporating three values: low, medium and high.

10.4.22 As shown in **Table 10-5**, effects that are identified as being moderate or major adverse/beneficial are classified as significant effects and those as minor or negligible as not significant.

Table 10-5: Significance Criteria

Significance Level		Criteria	CIEEM Geographical Criteria
Significant	Major	These effects are likely to be important considerations at a local or regional scale but, if adverse, are potential concerns to the project and may become key factors in the decision-making process.	Ecological impacts assessed as being significant at the regional scale and that have triggered a response in development control terms are considered to represent impacts that overall, within this assessment, are of major significance.
	Moderate	These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.	Ecological impacts assessed as being significant at the county/metropolitan scale, and that have triggered a response in development control terms, are considered to represent impacts that overall, within this assessment, are of moderate significance.
Not significant	Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the project and consideration of mitigation or compensation measures.	Ecological impacts assessed as being significant at the local scale, and that have triggered a response in development control terms, are considered to represent impacts that overall, within this assessment, are of minor significance.
	Insignificant	No effect or an effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.	Ecological impacts that have been assessed as not being significant at any geographic level.

Impact assessment guidance tables

10.4.23 The matrices in **Table 10-6** to **Table 10-8** have been used to help assess significance.

10.4.24 **Table 10-6** has been used as a means of generating an estimate of exposure to *change. Once a magnitude has been assessed, this has been combined with the* probability of occurrence to arrive at an exposure score which can then be used for the next step of the assessment, which is detailed in **Table 10-7**. For example, an impact pathway with a medium magnitude of change and a high probability of occurrence would result in a medium exposure to change.

Table 10-6: Exposure to change, combining magnitude and probability of change

Probability of Occurrence	Magnitude of Change			
	Large	**Medium**	**Small**	**Negligible**
High	High	Medium	Low	Negligible
Medium	Medium	Medium/Low	Low /Negligible	Negligible
Low	Low	Low /Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

10.4.25 **Table 10-7** has then been used to score the vulnerability of the features/receptors of interest based on the sensitivity of those features and their exposure to a given change.

Table 10-7: Estimation of vulnerability based on sensitivity and exposure to change

Sensitivity of Receptor (Table 10-2)	Exposure to change (Table 10-6)			
	High	**Medium**	**Low**	**Negligible**
High	High	High	Moderate	None
Moderate	High	Moderate	Low	None
Low	Moderate	Low	Low	None
None	None	None	None	None

10.4.26 The vulnerability has then been combined with the importance of the feature of interest using **Table 10-8** to generate an initial level of significance. For example, if a high vulnerability is assessed against a feature of low importance, the level of significance of the effect is assessed as minor.

Table 10-8: Estimation of significance based on vulnerability and importance

Importance of Receptor (Table 10-4)	Vulnerability of Feature to Impact (Table 10-7)			
	High	**Moderate**	**Low**	**None**
High	Major	Moderate	Minor	Insignificant
Moderate	Moderate	Moderate/Minor	Minor/Insignificant	Insignificant
Low	Minor	Minor/Insignificant	Insignificant	Insignificant
None	Insignificant	Insignificant	Insignificant	Insignificant

Significance criteria impact management (mitigation)

10.4.27 Impacts that are found to be significant in the process, (i.e., moderate and/or major adverse) may require mitigation measures to reduce residual impacts, as far as possible, to environmentally acceptable levels. Within the assessment procedure the use of mitigation measures will alter the risk of exposure and, hence, will require significance to be re-assessed and thus the residual impact (i.e., with mitigation) identified.

10.4.28 Mitigation measures considered throughout the EIA process can take three forms (as summarised in **Chapter 5: EIA Approach [TR030008/APP/6.2]**) (Ref 10-85):

a. *Embedded mitigation measures:* modifications to the location, design or operation of a development that are an inherent part of the Project and do not require additional action to be taken.

b. *Standard mitigation measures:* measures comprising management activities and techniques, which would be implemented during construction of the Project to limit impacts through adherence to good site practice and achieving legal compliance. These measures for the construction phase are set out in the **Outline Construction Environmental Management Plan** ("CEMP") **[TR030008/APP/6.5]**.

c. *Additional mitigation measures:* these comprise measures over and above any embedded and standard mitigation measures, for which the EIA has identified a requirement to further reduce likely significant environmental effects.

10.4.29 In addition, it is appropriate to adopt a mitigation hierarchy which, from the CIEEM (Ref 10-3) guidance on ecological impact assessment specifically, can be summarised as follows:

a. In the first instance, seek to adopt options that avoid harm.

b. Identify ways to minimise adverse effects that cannot be completely avoided through mitigation.

c. Provide compensation where there are significant residual adverse effects despite the mitigation proposed.

d. Provide net benefits (for biodiversity) above requirements for avoidance, mitigation or compensation.

10.4.30 In some instances, a decision may need to be taken despite residual uncertainty about the effects. In such cases, adaptive management, linked to a bespoke monitoring programme, is a well-established and recommended way of ensuring that any negative impacts or effects are addressed in the course of the development and during the subsequent operational phase.

Limitations and Assumptions

10.4.31 This assessment has been undertaken based on the following assumptions:

a. The Project design, as defined by the Parameters and the indicative construction methodology are provided in **Chapter 2: The Project [TR030008/APP/6.2]**.

b. Future maintenance dredging within the new berth pocket is expected to be very limited (if required at all) as summarised in the physical processes assessment (**Chapter 16: Physical Processes** of the **ES [TR030008/APP/6.2]**).

10.4.32 Whilst these are assumptions, the assessment within this ES has been undertaken considering the anticipated worst-case scenario in respect of ornithology receptors at the dredge, marine piling and disposal locations.

10.5 Study Area

10.5.1 The study area is the area over which potential direct and indirect effects of the Project may occur during construction and operation. The direct effects on ornithology receptors are those that occur within the footprint of the Project, such as the direct disturbance to supporting habitats and associated species as a result of the Project. Indirect effects are those that may arise outside this footprint, such as the potential noise and visual disturbance effects on waterbirds during construction.

10.5.2 The study area for coastal waterbirds is focused on the Port of Immingham ("the Port") area and proposed dredge disposal sites, with data for the wider Humber Estuary region presented where relevant to provide contextual information and to ensure the area of potential effects (e.g. noise disturbance) are fully considered. The study area for coastal waterbirds includes any terrestrial habitats adjacent to/ in close proximity to the Estuary that may support these species over the high tide period when intertidal habitats are reduced.

10.5.3 The study area for breeding birds (non-SPA/Ramsar species) comprised terrestrial habitats within the red line boundary that were identified as having the potential to support nesting species. The rationale for the scoping of breeding bird surveys is set out in the **Preliminary Ecological Appraisal** ("PEA") (**Appendix 8.B [TR030008/APP/6.4]**).

10.6 Baseline Conditions

Current Baseline

10.6.1 Current baseline conditions have been determined by a desk-based review of available information (as well as the field surveys undertaken as set out in **Section 10.6**) including:

a. 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 (**Figure 10.1 [TR030008/APP/6.3]**). 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 five-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.

b. 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 10-20).

c. NE Designated Sites Portal: Background information on the ecology of SPA qualifying bird species in the Humber Estuary (Ref 10-21).

d. 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 10-22). 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.

e. 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 10-23).

f. Wintering/passage surveys of land within West Site and the Temporary Compound Area in winter 2022/23 that were identified during the Phase 1 Habitat survey as being potentially suitable for wintering/ passage waterbirds, to determine whether the land supported important aggregations of Humber Estuary SPA/Ramsar waterbirds such that it would be considered 'functionally linked land'.

Breeding bird surveys of land within West Site (in spring/ summer 2022), East Site – Ammonia storage area (in spring/summer 2023) and Long Strip Woodland (in spring/summer 2023) that were identified during the Phase 1 Habitat survey as being potentially suitable for notable aggregations of breeding birds.

Nature conservation sites and protected species

Designated sites

10.6.2 The Project falls within the boundaries of the Humber Estuary SAC, SPA and Ramsar site (collectively forming the Humber European Marine Site ("EMS"); **Figure 10.2 [TR030008/APP/6.3]**).

10.6.3 Qualifying features of the Humber Estuary SPA and Humber Estuary Ramsar site are shown in **Table 10-9** and **Table 10-10** respectively, at the time of designation in 2005.

Table 10-9: Qualifying features of the Humber Estuary SPA

Internationally Important Populations	
Internationally Important Populations of Regularly Occurring Annex 1 Species	
Breeding Species Population	
Bittern *Botaurus stellaris*	Two calling males (10.5 % of the GB population)
Marsh Harrier *Circus aeruginosus*	Ten 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)
Wintering Species Population	
Bittern	Four (4.0 % of the GB population)
Hen harrier *Circus cyaneus*	Eight (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	
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)
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)

Internationally Important Populations	
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.	

Source: Ref 10-25

Table 10-10: Qualifying marine features of the Humber Estuary Ramsar Site

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 (five-year peak mean 1998/99-2002/23)

Ramsar Criterion	
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 1996/97-2000/01)
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.	

Source: Ref 10-26

10.6.4 The Greater Wash SPA is designated for a range of seabird and diving bird species and is located approximately 20km from the Study Area but has been included given the potential for connectivity between this SPA and the Study Area. Qualifying features of this site are shown in **Table 10-11**.

Table 10-11: 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)

Internationally Important Populations	
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)

Source: Ref 10-27

10.6.5 The Humber Estuary SSSI overlaps part of Study Area. This is designated for its nationally important habitat assemblage (intertidal mudflats and sandflats, and coastal saltmarsh) geological interest, importance to breeding, wintering and passage birds, breeding grey seal and the presence of river and sea lamprey.

10.6.6 North Killingholme Haven Pits SSSI is located approximately 6km away from the Study Area. This SSSI comprises saline lagoon habitats and supports important populations of waders including Black-tailed Godwits and Redshank. The Lagoons SSSI is located approximately 20km from the Site and supports a variety of coastal habitats (such as saline lagoons and sand dunes) and well as a population of breeding Little Terns.

10.6.7 The nearest Local Nature Reserve ("LNR") is Cleethorpes Sands LNR (located approximately 13km south east of the Study Area) which supports a variety of intertidal and coastal habitats.

Protected species

10.6.8 The *Wildlife and Countryside Act (1981) (as amended)* (Ref 10-13) protects various animals, plants, habitats in the UK including bird species. In addition, all naturally occurring wild bird species, their eggs, nests and habitats are strictly protected under the Birds Directive.

10.6.9 Some marine fauna and habitats are listed as priority species and habitats of principle importance in England, as required under Section 41 of the *NERC Act (2006) (England)* (Ref 10-15). Species of principle importance which are of relevance to the Humber Estuary include various species of waterbird. Habitats of principle importance of relevance to the Humber Estuary include supporting habitat for waterbirds including intertidal mudflats and coastal saltmarsh.

Coastal waterbirds

Humber Estuary overview

10.6.10 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 10-20; Ref 10-23).

10.6.11 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 10-21).

10.6.12 **Table 10-12** provides summary ecology information on key waterbird species occurring in the Humber Estuary in intertidal and marine habitats. This includes the five-year estuary-wide mean peaks for these species for 2017/18 to 2021/22 (the most recent five-years of data available from the BTO) (Ref 10-20).

Table 10-12: 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	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]
				in the Inner Humber Estuary as well as Salt 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	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]
			polychaete worms on mudflats and earthworms from wet fields.			
	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	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]
			Limecola balthica, crustaceans (such as brown shrimp *Crangon crangon and* mud shrimp *Corophium* spp.*) and* the mud snail *Peringia ulvae*. Will also consume terrestrial 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	Largest wintering flocks are present in the inner Humber around Far Ings/Read's Islands,	Aug-Sep	2,576

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]
			*H. diversicolo*r. Insects, especially Chironomidae larvae, in freshwater habitats.	close to the favoured locations for breeding.		
	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% worms. Other species sometimes consumed include the shrimp *Crangon crangon* and bivalve *Limecola balthica.*	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 Humber), and Paull Holme Strays (also Middle Humber).	Feb, Sep, Nov-Dec	1,867
	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.	Within the Humber Estuary, Sanderling are found exclusively in the outer estuary, particularly on	Feb, May, Aug, Nov-Dec	575

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]
			Diet proportions comprise 60% worms, 1% molluscs and 39% 'other'.	the sandflats of the Lincolnshire coast.		
	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
	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	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	Aug-Oct	76

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]
		omnivores more generally		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.		
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
	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	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

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]
			Corophium volutator, bivalves and polychaetes.			
	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
	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

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]
	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
	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

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]
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
	Cormorant	Piscivorous pursuit diver	Feeds on fish such as flatfish, blennies gadoids, sandeel, salmonid and eels.	Widely distributed.	Jan-Mar, Nov	438

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]
	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 10-28 and Ref 10-29:

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.

Piscivorous pursuit diver: Seabirds foraging for fish through pursuit diving.

2. Based on Ref 10-30; Ref 10-31 and Ref 10-32.

3. Based on Ref 10-31 and Ref 10-33

4. Months when peaks count occurred in the 2017/18 to 2021/22 estuary-wide BTO Core Counts (Ref 10-20).

5.Data from Ref 10-20.

10.6.13 The most abundant wading bird species recorded in the Humber Estuary are Knot and Golden Plover (five-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 (five-year mean peak of 15,247 birds) and Dunlin (five-year mean peak of 17,634 birds) as well as Oystercatcher, Black-tailed Godwit, Grey Plover, Curlew, Avocet and Bar-tailed Godwit (Ref 10-20). 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 10-21). 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 10-31; Ref 10-22).

10.6.14 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 10-30; Ref 10-31).

10.6.15 The most abundant wildfowl bird species recorded in the Humber Estuary are Pink-footed Goose and Shelduck (five-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 10-23; Ref 10-22). Other commonly occurring wildfowl include Teal, Dark-bellied Brent Geese, Wigeon, Greylag Goose and Mallard (Ref 10-20). 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 10-21).

10.6.16 Black-headed Gull (five-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.

10.6.17 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 10-21).

10.6.18 Diving birds occurring in the Humber Estuary include Common Scoter and Goldeneye (five-year mean peak of 408 and 299 birds respectively) with Cormorants and Tufted Duck also occurring in relatively large numbers.

10.6.19 Little Tern breed at Easington Lagoon, which is located approximately 20km from the Project (Ref 10-21), with data suggesting this species forages within 5km of nesting sites (Ref 10-34. Sandwich Tern (five-year mean peak of 578 birds) and Common Tern (five-year mean peak of 247 birds) are also regularly recorded, particularly in passage periods in the Humber Estuary.

Immingham area

10.6.20 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 ("IOT") Jetty and Oldfleet Drain (as shown in **Figure 10.1 [TR030008/APP/6.3]**). The most recent five-years of data (2018/19 to 2022/23) has been analysed for this sector (**Table 10-13**). 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 10-14**). **Appendix 10.A [TR030008/APP/6.4]** presents monthly peak counts for the period October 2021 to September 2022.

10.6.21 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[4] is presented in **Table 10-13**. The five-year average of the annual peak counts for each species (referred to as the mean peak)[5] is also presented in **Table 10-13**. This table also compares the five-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[6].

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 supports more than 1% of the British population it is considered Nationally Important (for that species or subspecies).

4 The combined peak count is a summed value derived from the largest count of both feeding and roosting birds during the same hourly count.

5 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 ive-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 five-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 10-35).

6 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 04/04/22) (Ref 10-36).

c. **Latest Humber Estuary WeBS Core Counts ive-year average:** The five-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 10-20). 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 [7].

10.6.22 The five-year mean peak number of birds in Sector C during different winter months is presented in **Figure 10.3 [TR030008/APP/6.3]** 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 10.4 [TR030008/APP/6.3]**.

10.6.23 During the surveys, over 25 waterbird species have been recorded on the foreshore within Sector C with approximately 20 species considered regularly occurring.

10.6.24 The most numerous wading bird species recorded foraging within the area over this period were Black-tailed Godwit and Dunlin (five-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 10-13**). Dunlin were regularly recorded in numbers considered locally important (i.e., representing >1% estuary wide numbers[8]) 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.

10.6.25 Shelduck were the most abundant wildfowl species recorded foraging (five-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.

10.6.26 With respect to roosting birds, Black-tailed Godwit was the most numerous species recorded (five-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 (five-year mean peak of 32 and 26 birds, respectively) as well as Knot, Redshank and Turnstone.

[7] 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.
[8] Compared against the estuary-wide WeBS 5-year mean peak (2017/18 to 2021/22).

Table 10-13: 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	2016	2591	1740	1609	1	1352	700	238	580	574	944	1352	2016	2591	1740	1729
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

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
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

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
Mallard†	2	3				1		2	2			<1	2	3	2			1
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

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
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 five-year MP.																	
	Cells highlighted orange indicate the count is of regional importance (>10%) of the current estuary wide WeBS five-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 five-year MP – 565 birds) is higher than the national importance threshold (390 birds).																	
	Cells highlighted red indicate the count is of international importance.																	

10.6.27 As shown in **Figure 10.3 [TR030008/APP/6.3]**, 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.

10.6.28 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 10-14**). 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.

10.6.29 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 10-23).

10.6.30 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 10.4 [TR030008/APP/6.3]**). Lower numbers are recorded in the western section of Sector C which is described in more detail in the Section below.

10.6.31 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.

10.6.32 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 five-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 [9]. Core counts are also only typically undertaken around high water

[9] The sector includes foreshore adjacent to the Port of Immingham and also extents east of the IOT terminal jetty (Ref 10-37).

periods and so do not provide information through the tide or during low water periods.

Table 10-14: 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

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
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

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
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
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

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
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 five-year MP.
	Cells highlighted orange indicate the count is of regional importance (>10%) of the current estuary-wide WeBS five-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 five-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

10.6.33 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 400-500m 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.

10.6.34 The distribution of waterbirds in this area is shown in **Figure 10.4 [TR030008/APP/6.3]** 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 10-15.** The abundance levels of these species have also been compared against the estuary-wide WeBS five-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.

10.6.35 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 10.4 [TR030008/APP/6.3]**).

10.6.36 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).

10.6.37 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 five-year mean peak (2017/18 to 2021/22). Counts of other species represent <1 of the estuary-wide WeBS five-year mean peak.

10.6.38 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 five-year mean peak.

Table 10-15: Counts recorded as part of the IOH Ornithology Surveys in Sector C between 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)

10.6.39 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.

10.6.40 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 (**Appendix 10.A [TR030008/APP/6.4]**). 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.

10.6.41 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 [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[10] and the surveys did not record any locally important aggregations of SPA/Ramsar waterbirds (i.e. at numbers >1% of the WeBS five-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 five-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 **Appendix 10.A [TR030008/APP/6.4]**.

Terrestrial Habitats (Breeding SPA/Ramsar Species)

10.6.42 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

[10] 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.

Terrestrial Habitats (Breeding Non-SPA/Ramsar Species)

Desk Study

10.6.43 The Lincolnshire Environmental Records Centre desk study returned a number of records of breeding species within the study area, including five species listed on Annex I of the EC Birds Directive, 13 species listed on Schedule 1 of the Wildlife and Countryside Act (1981) (as amended) (Ref 10-13), 15 Species of Principal Importance ("SPI"), and respectively 16 Red List and seven Amber List species included in the Birds of Conservation Concern 5 ("BoCC5"). The records also include 14 species of bird that are priority species in Lincolnshire listed on the Lincolnshire Biodiversity Action Plan ("BAP").

10.6.44 Previous breeding bird surveys of the West Site in 2013 for planning application DM/1027/113/OUT recorded the following breeding species on the West Site:

a. Grassland habitat: ground nesting skylark (*Alauda arvensis*) and meadow pipit (*Anthus pratensis*).

b. Ditches: reed warbler (*Acrocephalus scirpaceus*), sedge warbler (Acrocephalus schoenobaenus) and reed bunting (Emberiza schoeniclus).

c. Boundary hedgerows: blackcap (*Sylvia atricapilla*), chiffchaff (*Phylloscopus collybita*), willow warbler (*Phylloscopus trochilus*), whitethroat (*Sylvia communis*), lesser whitethroat (*Sylvia curruca*), tree sparrow (*Passer montanus*), yellowhammer (*Emberiza citrinella*), linnet (*Carduelis cannabina*) and song thrush (*Turdus philomelos*).

Breeding Bird Survey Method

10.6.45 The Common Bird Census ("CBC") methodology was scaled down from ten to five visits during the breeding bird season; this was considered adequate to provide a good indication of the breeding bird ornithological baseline for the purposes of an assessment of ornithological impacts.

10.6.46 The surveys involved recording all the birds observed, their locations and activity/behaviour. Contacts with birds (by song, call or sighting) were marked on the survey map using BTO species codes and standard behaviour notation (Ref 10-38).

10.6.47 Surveys were undertaken during the mornings in suitable weather conditions (unrestricted visibility, winds less than Beaufort 5 and not in continuous rain). Surveys were undertaken in the following areas of terrestrial habitat within the Site Boundary:

a. West Site - 17 March, 11 April, 5 and 25 May and 21 June 2022.

b. East Site – Ammonia Storage site and Long Strip Woodland (within the Pipe Rack and Jetty Access Road site) - 3 and 31 March, 18 April, 5 May and 19 May 2023.

10.6.48 The survey maps were analysed to determine breeding activity for species of conservation concern and/or protected species according to the following categories:

a. Possible breeding – species present during the survey period in possible nesting habitat, but with no indication of breeding. Presumed passage migrants are not included.

b. Probable breeding – observations of one or more of the following activities during the survey period:

   i. singing male heard, or breeding calls heard

   ii. pair observed in suitable nesting habitat during the survey period

   iii. display or courtship

   iv. birds visiting a probable nest site

   v. birds seen to be carrying nesting material

c. Confirmed breeding – observations of any one or more of the following activities during the survey period:

   i. agitated behaviour or anxiety calls from adults suggesting a nest or young close by

   ii. distraction display or injury feigning from adults

   iii. a nest has obviously been used or eggshells found

   iv. adults seen carrying food for young

   v. adults seen carrying faecal sac away from nest site

   vi. nest with eggs

   vii. nest with young or downy young in the case of waders, game birds etc.

   viii. recently fledged young

   ix. soliciting calls from young birds

d. Non-breeding – species present during the survey period however the habitat type within the survey area is unsuitable for the particular species (for example passage migrants).

Breeding Bird Survey Results

10.6.49 Breeding bird survey results (including a map showing the assumed location of identified breeding territories) are presented in **Appendix 10.A [TR030008/APP/6.4]**, and a summary of the results is presented below.

10.6.50 The assemblage recorded within the West Site was similar to that recorded during previous surveys in 2013 (information contained within an ecology report submitted with planning application DM/1027/13/OUT).

Table 10-16: Summary of Breeding Birds Recorded on the Site

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)		
							West Site	East Site – Ammonia Storage site	Long Strip Woodland
Pheasant	*Phasianus colchicus*						Probable	Possible	Possible
Woodpigeon	*Columba palumbus*	Amber					Probable	Probable	Probable
Blue Tit	*Cyanistes caeruleus*						Possible	Confirmed	Confirmed
Great Tit	*Parus major*						Possible	Confirmed	Confirmed
Skylark	*Alauda arvensis*	Red			✓	s.41 species	Probable		
Cetti's Warbler	*Cettia cetti*			✓			Probable		Possible
Long-tailed Tit	*Aegithalos caudatus*						Probable	Confirmed	Confirmed
Willow Warbler	*Phylloscopus trochilus*	Amber					Probable		
Chiffchaff	*Phylloscopus collybita*						Probable	Probable	Probable
Sedge Warbler	*Acrocephalus schoenobaenus*	Amber					Probable		Possible
Reed Warbler	*Acrocephalus scirpaceus*						Probable		
Blackcap	*Sylvia atricapilla*						Possible	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)		
							West Site	East Site – Ammonia Storage site	Long Strip Woodland
Whitethroat	*Sylvia communis*						Probable		Possible
Wren	*Troglodytes troglodytes*	Amber					Probable	Confirmed	Confirmed
Blackbird	*Turdus merula*						Probable	Confirmed	Confirmed
Song Thrush	*Turdus philomelos*	Amber			✓	s.41 species	Probable		Possible
Robin	*Erithacus rubecula*						Probable	Probable	Probable
Meadow Pipit	*Anthus pratensis*	Amber					Probable		
Chaffinch	*Fringilla coelebs*						Probable	Probable	Probable
Linnet	*Linaria cannabina*	Red			✓	s.41 species	Probable	Not breeding	
Goldfinch	*Carduelis carduelis*						Probable	Probable	Probable
Reed Bunting	*Emberiza schoeniclus*	Amber			✓	s.41 species	Probable		
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		

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)		
							West Site	East Site – Ammonia Storage site	Long Strip Woodland
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

West Site

10.6.51 One probable breeding pair of the Annex I species Cetti's warbler was recorded within the West Site. Cetti's warbler, a previously rare UK species restricted to the southern region, has rapidly expanded its breeding range north and is now referred to in the Lincolnshire Bird Atlas as an "…*increasing breeding resident and passage migrant/winter visitor in Lincolnshire*" (Ref 10-39). Cetti's warbler has also been recently (in 2019) taken out of the UK Rare Breeding Birds Panel annual reports, reflecting its substantial increases in breeding numbers and range across the country. The south bank of the Humber was reported to support 93 singing males at the time of the 2021 Lincolnshire Bird Atlas publication, and it is therefore concluded to be relatively widespread in suitable habitats along the south bank of the Humber in North East/North Lincolnshire.

10.6.52 Two Red List species of high conservation concern were recorded probably breeding, with one pair each of skylark and linnet recorded within the West Site. There were seven Amber List species of moderate conservation concern recorded as probably breeding within the West Site, with sedge warbler and reed bunting being present on several of the overgrown ditches within the Site where there was an abundance of common reed to provide nesting sites for these species.

10.6.53 A total of 22 confirmed/possible/probable breeding species were recorded within the West Site. Based on the criteria published by Fuller (Ref 10-41), this assemblage would fall beneath the 'Local' significance band of 25 to 49 breeding species. As no rare or notable species were recorded, it is therefore concluded that the breeding bird assemblage is of Site value to nature conservation.

East Site – Ammonia Storage site

10.6.54 The breeding assemblage recorded within this part of the Site was limited to small numbers of common species of breeding bird, that were typically restricted to peripheral areas of more mature scrub along the boundaries of the site, and along the mature scrub boundary to Queens Road. No breeding bird species were recorded nesting on the open areas of cleared land within the central part of the site. Buzzard was recorded within the Site and may be breeding given that there is suitable habitat for nest construction, although a nest site was not identified.

10.6.55 A total of 16 confirmed/ possible/probable breeding species were recorded within the East Site – Ammonia Storage Site. Based on the criteria published by Fuller (Ref 10-41), this assemblage would fall beneath the 'Local' significance band of 25 to 49 breeding species. As no rare or notable species were recorded, it is therefore concluded that the breeding bird assemblage is of Site value to nature conservation.

Long Strip Woodland (Pipe Rack and Jetty Access Road site)

10.6.56 One possible breeding pair of the Annex I species Cetti's warbler was recorded within the northern section of Long Strip Woodland (within the few metres closest to the flood embankment). As discussed above in respect of the likely presence of this species within West Site, this species is increasing its range and is now considered widespread in suitable habitats along the south bank of the Humber in North East/North Lincolnshire.

10.6.57 A total of 20 confirmed/possible/probable breeding species were recorded within the Long Strip Woodland. Based on the criteria published by Fuller (Ref 10-41), this assemblage would fall beneath the 'Local' significance band of 25 to 49 breeding species. However, this habitat supported several less common and less widespread species that are dependent on woodland habitats for breeding, such as great spotted woodpecker, stock dove and lesser whitethroat. Furthermore, as the woodland habitat is considered relatively uncommon within this part of Lincolnshire, it is considered reasonable that the assemblage could be evaluated as of Local value to nature conservation, and this would evidence its higher value when compared to other surveyed areas within the wider Site boundary that were evaluated as of Site value only in respect of their breeding bird assemblages.

Future Baseline

10.6.58 The future baseline considers potential changes to ornithology receptors.

10.6.59 In the absence of the Project, the current marine coastal processes would remain the same as described in **Chapter 16: Physical Processes [TR030008/APP/6.2]**.

10.6.60 Coastal bird species are likely to become increasingly vulnerable to anthropogenic pressures in the future due to the predicted effects of climate change and ocean acidification in combination with more local pressures. The 2020 Marine Climate Change Impact Partnership report card (Ref 10-40) highlighted the following changes to ecology receptors could potentially occur as a result of climate change:

a. Sea-level rise could result in deeper waters and larger waves reaching saltmarsh and other intertidal habitats, causing erosion at the seaward edge.

b. Changes in patterns of rainfall or temperature changing vegetation composition of coastal saltmarsh communities.

c. Coastal waterbirds showing north-easterly shifts in the winter distributions n Europe.

d. Changes in prey distribution and availability, resulting in range shifts in some regional populations of marine mammals, fish and seabirds.

10.6.61 Data suggests that ecological changes linked to climate change (such as range shifts) are already occurring although there is currently a high degree of uncertainty with respect to predicting the magnitude of potential effects in the future.

10.7 Development Design and Impact Avoidance

Embedded Mitigation Measures

10.7.1 The Project has been designed, as far as possible, to avoid and minimise impacts and effects to ornithology through the process of design development, and by embedding mitigation measures into the design, such as minimising the footprint of the works as far as possible to reduce the potential loss of intertidal supporting habitat for waterbird species. The Piperack and Jetty Access Road has also been designed to minimise woodland loss within Long Strip woodland.

Standard Mitigation Measures

Impacts on Nesting Birds (construction)

10.7.2 Vegetation clearance will be undertaken outside the nesting bird season where possible, and clearance works will be avoided in the period March to August inclusive to ensure compliance with the Wildlife and Countryside Act (1981) (as amended) (Ref 10-13).

10.7.3 Where this is not possible, pre-clearance checks of vegetation would be undertaken to identify any nesting species. If occupied nests are identified, an appropriate buffer zone (at least 2m) would be established around the nest to ensure it is protected from damage/ destruction during construction. No clearance of vegetation within the buffer zone would be undertaken until any young had fledged and the nest was confirmed to be unoccupied.

10.8 Assessment of Likely Impacts and Effects

10.8.1 The assessment has identified the likely significant effects on ornithology receptors as a result of the construction and subsequent operation of the Project.

10.8.2 The Physical Processes assessment (**Chapter 16: Physical Processes [TR030008/APP/6.2]** and Water and Sediment Quality assessment (**Chapter 17: Marine Water and Sediment Quality [TR030008/APP/6.2]**) have informed the outcomes of the ornithology assessment.

10.8.3 Potential impacts on features of internationally designated sites (SACs, SPAs and Ramsar sites) have been assessed within the **Shadow HRA [TR030008/APP/7.6]**. With respect to ornithology features of Humber Estuary SSSI, potential impacts on the following features are considered in the ES and **Shadow HRA [TR030008/APP/7.6]:**

a. Shelduck
b. Redshank
c. Black-tailed Godwit
d. Teal
e. Turnstone
f. Oystercatcher
g. Curlew

10.8.4 All other waterbird features of the SSSI have not been specifically assessed in the ES and Shadow HRA as they are considered to be rare (or only occur in very low numbers) within the Immingham area.

10.8.5 It is noted that the Killingholme Haven Pits Site SSSI which is located approximately 6km away from the Project could be functionally linked to the mudflat habitat in the Project footprint with local populations of species such as Dunlin and Black-tailed Godwit potentially utilising both areas. However, Killingholme Haven Pits is considered too distant to be impacted directly by the Project (such as through direct disturbance effects or due to the footprint of habitat loss or change). The zone of influence of indirect habitat changes as a result of changes to hydrodynamic or sedimentary processes will also not overlap with the SSSI. With respect to potential indirect effects of bird disturbance on the SSSI (e.g. changes in local population levels resulting from changes in distribution or mortality), based on the predicted magnitude of potential effects and proposed mitigation, Black-tailed Godwit and other waterbirds populations that occur at Killingholme Haven Pits SSSI would not be expected to disperse out of the Immingham area and would continue to use both the SSSI and the foreshore in the Immingham area. Furthermore, population level consequences (at both a local and fly way level) in terms of mortality or changes in breeding success is considered highly unlikely assuming the proposed mitigation for the Project (**Section 10.9**) is implemented. On this basis, the numbers of Black-tailed Godwit and other waterbirds utilising Killingholme Haven Pits would not be expected to change as a result of both direct and indirect effects due to the Project and the impact on this designated site is considered insignificant.

10.8.6 The Lagoons SSSI is located approximately 20km from the Project with Little Tern a notified feature of the SSSI. However, data suggests that this species forages within 5km of nesting sites (Ref 10-34) with this species considered very rare within the Immingham area. On this basis, this notified feature 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.

10.8.7 Cumulative impacts on ornithology receptors that could arise as a result of other coastal and marine developments and activities in the Humber Estuary combined with the Project are considered as necessary and is assessed as part of **Chapter 25: Cumulative and In-Combination Effects [TR030008/APP/6.2]**.

Construction

10.8.8 This section contains an assessment of the potential impacts to ornithology receptors as a result of the construction phase of the Project. Potential effects during the construction phase that are considered relevant are reviewed in **Table 10-17**. It should be noted that the table includes the rationale for the scoping in or out of individual pathways for further assessment in this ES.

Table 10-17: Potential effects during construction scoped in / out of further detailed assessment

Impact Pathways Potential Effects	Project activity	Included in assessment?	Justification
Direct loss to intertidal feeding and roosting habitat as a result of the piles	Marine piling	Yes	Marine piling would result in the small loss of intertidal habitat. This impact pathway has, therefore, been scoped into the assessment.
Direct changes to waterbird foraging habitat as a result of the capital dredge and dredge disposal	Capital dredge and dredge disposal	No	The footprint of the marine 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. Capital dredging and dredge disposal at sea has the potential to cause impacts to seabed habitats which could cause changes to the prey resources available for seabirds and other diving birds. However, the seabed in the vicinity of the berth pockets and at the disposal sites are highly dynamic and subject to regular physical disturbance as a result of maintenance dredging and strong tidal currents. These areas are likely to provide a limited prey resource and are also not known to support large populations of diving birds/seabirds. This impact pathway has, therefore, been scoped out of the assessment.
Indirect changes to foraging and roosting habitat as a result of changes to hydrodynamic and sedimentary processes	Marine works (jetty structure and capital dredge)	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 changes to intertidal feeding and roosting habitat. This impact pathway has, therefore, been scoped into the assessment.
	Dredge disposal	No	Dredge disposal 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). The seabed in the vicinity of the disposal sites is highly dynamic and subject to regular physical disturbance as a result of maintenance

Impact Pathways Potential Effects	Project activity	Included in assessment?	Justification
			dredging and strong tidal currents. As described in more detail in **Chapter 16: Physical Processes [TR030008/APP/6.2]**, only minor changes in flow rates and subtidal seabed morphology are predicted which are not expected to modify existing subtidal habitat types found in the area (i.e. mobile sand habitats characterised by an impoverished infaunal assemblage). On this basis, these areas are likely to provide a limited prey resource and are also not known to support large populations of diving birds/seabirds. This impact pathway has, therefore, been scoped out of the assessment.
Changes to seabed habitats and species as a result of sediment deposition during marine piling	Marine piling	No	Marine piling has the potential to result in the localised resuspension of sediment as a result of seabed disturbance. The amount of 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 has, therefore, been scoped out of the assessment for coastal waterbirds in terms of changes to supporting habitat and prey resources.
Direct loss of terrestrial habitats that are functionally linked to the Humber Estuary SPA/Ramsar	Construction	No	None of the habitats within the Site boundary are functionally linked land to the Humber Estuary SPA/Ramsar.
Direct loss of breeding bird (SPA/Ramsar) habitats	Construction	No	No suitable habitats for breeding SPA/Ramsar species are present within the Site. This impact pathway has, therefore, been scoped out of the assessment
Direct loss of breeding bird (non-SPA/Ramsar) habitats	Construction	Yes	With the exception of Long Strip Woodland, the breeding bird assemblage on the Site is evaluated to be of Site nature conservation importance and is therefore not scoped in as a relevant ecological feature for the purposes of impact assessment.

Impact Pathways Potential Effects	Project activity	Included in assessment?	Justification
			Long Strip Woodland (within the Pipe Rack and Jetty Access Road) has relatively low diversity, and thus its breeding bird assemblage is somewhat limited, although has been evaluated as being of Local importance as it is clearly of higher nature conservation value than other habitats within the Site.
Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats	Construction	Yes	During construction, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds. This impact pathway is considered in more detail below.
Airborne noise and visual disturbance to coastal waterbirds using functionally linked terrestrial habitats outside the boundary of the Humber Estuary SPA/Ramsar	Construction	Yes	During construction, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds using functionally linked land. This impact pathway is considered in more detail below.
Noise and visual disturbance during capital dredge disposal	Capital dredge and dredge disposal	No	During dredge disposal, there is the potential for the dredging vessel to cause noise and visual disturbance. However, only a very small increase in vessel movements in the vicinity of the disposal site due to the capital dredge activity will occur. In addition, these areas are also not known to support large populations of diving birds/seabirds. Research has shown that disturbance to birds from vessel movements generally occurs within 50 to 100m with vessels approaching at faster speeds eliciting higher disturbance (Ref 10-42; Ref 10-43; Ref 10-44). However, it is acknowledged that some species such as Red-throated Diver and Common Scoter are considered particularly sensitive to disturbance from vessels and could be disturbed at greater distances (Ref 10-44; Ref 10-45; Ref 10-46; Ref 10-47. Any potential disturbance stimuli caused by the capital dredge disposal would be restricted to a localised area in the vicinity of the vessel for most species with even sensitive

Impact Pathways Potential Effects	Project activity	Included in assessment?	Justification
			species (such as Common Scoter) expected to be temporarily redistributed locally, rather than dispersing out of the area. In addition, vessels will only be at the disposal sites for short durations of time with any birds that might be temporarily flushed able to return to feeding following cessation of the capital dredge disposal activity. In addition, the foraging ranges of diving bird species encompasses an extensive area which will not be spatially restricted to the disposal sites which are not considered to be important foraging areas for diving bird species. In addition, it should be noted that due to the high levels of existing maintenance dredging activities within the area, seabirds and other diving birds foraging in the dredge footprint would be expected to be reasonably habituated to vessels with more sensitive species already likely to be avoiding this area. This impact pathway has, therefore, been scoped out of the assessment.

10.8.9 This section contains an assessment of the potential impacts to coastal waterbird receptors as a result of the construction phase of the Project. The following impact pathways have been assessed:

a. Direct loss to intertidal feeding and roosting habitat as a result of the piles.

b. Indirect changes to intertidal foraging and roosting habitat as a result of changes to hydrodynamic and sedimentary processes.

c. Direct loss of breeding habitat used by non-SPA/ Ramsar birds.

d. Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats and functionally linked terrestrial habitats outside the boundary of the Humber Estuary SPA/.Ramsar Site.

Direct loss to intertidal feeding and roosting habitat as a result of the piles

General scientific context

10.8.10 Coastal developments can cause a loss or change to habitats which are of functional importance for waterbirds (Ref 10-79).

10.8.11 The quality of intertidal habitat as a feeding resource for waterbirds can be highly variable both spatially and temporally (Ref 10-81). 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 10-82).

10.8.12 Habitat loss can also result in increased densities of birds already using a site, increasing the potential for competition (Ref 10-83; Ref 10-82). Loss or severe degradation of intertidal habitat could displace birds and cause them to redistribute either locally or to neighbouring sites (Ref 10-84). 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 10-86). Lambeck (Ref 10-87) 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.

Project impact assessment

10.8.13 The piles will cause a direct loss of up to 0.00158 ha of intertidal mudflat habitat.

10.8.14 The loss of habitat represents approximately 0.000004% of the Humber Estuary SPA/Ramsar[11]. When considering this in the context of intertidal, the area of loss represents approximately 0.000018 % of intertidal foreshore habitats[12] and approximately 0.000025 % of mudflat[13] within the SPA/Ramsar.

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

10.8.16 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 of a magnitude that will not change the overall structure or functioning of the nearby mudflats within the Port area or more widely in the Humber Estuary.

10.8.17 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.

10.8.18 Based on the evidence provided above, the probability of habitat loss occurring is high, albeit minimal, but the magnitude of potential impacts is considered to be negligible. Exposure to change is, therefore, negligible. Local populations of waterbirds are considered to have a low sensitivity to the scale of habitat loss predicted. On this basis, vulnerability is assessed as none. Importance is high given the protection afforded to the supporting habitats and bird species in the area of predicted loss. On this basis, the impact is assessed as **insignificant**.

Indirect changes to intertidal foraging and roosting habitat as a result of changes to hydrodynamic and sedimentary processes

General scientific context

Background scientific context on the potential effects that habitat loss or change can have on waterbirds as a result of coastal development has already been provided above in in **Paragraphs 10.8.10** to **10.8.18**, and is, therefore, not repeated here.

Project impact assessment

10.8.19 Numerical modelling has been carried out to investigate the extent of changes to intertidal habitat from the marine works (jetty structure and capital dredge) and is presented in detail in **Chapter 16: Physical Processes [TR030008/APP/6.2]**. 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.

10.8.20 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

[11] Based on the extents given in the Standard Data Form on the JNCC website (Ref 10-25)
[12] Based on using the ‘Intertidal Substrate Foreshore (England and Scotland)’ data layer (Ref 10-48)
[13] Based on using mudflat data layer of the Priority Habitat Inventory (England). (Ref 10-49).

intertidal area (up to approximately 0.03 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).

10.8.21 This loss represents 0.00008% of the Humber Estuary SPA/Ramsar[14]. When considering this in the context of intertidal area, the area of loss represents approximately 0.00034% of intertidal foreshore habitats[15] and approximately 0.00047% of mudflat[16] within the SPA.

10.8.22 The predicted intertidal loss also consists of a very narrow strip on the lower shore around the sublittoral fringe which is 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 10-15**). 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.

10.8.23 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.

10.8.24 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.

10.8.25 Based on the evidence provided above, the probability of habitat loss occurring is high, albeit minimal, but the magnitude of potential impacts is considered to be negligible. Exposure to change is, therefore, negligible. Local populations of waterbirds are considered to have a low sensitivity to the scale of habitat loss predicted. On this basis, vulnerability is assessed as none. Importance is high given the protection afforded to the supporting habitats and bird species in the area of predicted loss. On this basis, the impact is assessed as **insignificant**.

Direct loss of breeding bird (non-SPA/ Ramsar) habitats

10.8.26 The loss of woodland within Long Strip will result in an adverse effect on breeding birds, due to the permanent nature of the habitat impacts and thus the permanent displacement of nesting pairs.

[14] Based on the extents given in the Standard Data Form on the JNCC website Ref 10-25
[15] Based on using the 'Intertidal Substrate Foreshore (England and Scotland)' data layer
[16] Based on using mudflat data layer of the Priority Habitat Inventory (England)

10.8.27 Based on the relatively limited diversity of the woodland habitats and the generally low numbers of common species of breeding birds, the breeding bird assemblage is evaluated to be of Local value to nature conservation. It is therefore assessed that the permanent loss of breeding bird territories within the woodland will result in a **moderate adverse** effect, that would be **significant** (Local level).

Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats

General scientific context

Introduction

10.8.28 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 10-89; Ref 10-96). Where disturbance causes birds to take flight, it can increase energy demands and may increase food consumption by decreasing the available habitat area (Ref 10-93; Ref 10-95; Ref 10-99). 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 10-91; Ref 10-92; Ref 10-90). Birds typically show a dispersive response to disturbance with prolonged disturbance causing displacement (Ref 10-93; Ref 10-67; Ref 10-97).

10.8.29 Disturbance often occurs through a combination of simultaneous visual and noise stimuli, although some occurrences may be through separate visual or noise stimuli (Ref 10-101). 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 10-88, Ref 10-98; Ref 10-94; Ref 10-89; Ref 10-64; Ref 10-100).

Disturbance response associated with construction activity

10.8.30 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 10-88).

10.8.31 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 10-102; Ref 10-51; Ref 10-50; Ref 10-55). 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 10-102). The greater effect of human presence as opposed to general construction works and machinery is also supported by Institute of Estuarine Coastal Studies (“IECS”) (Ref 10-50), 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.

10.8.32 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 50 m of Bury Marsh (Ref 10-51).

10.8.33 Studies into the distances from activities that evoke a disturbance response 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 100 m (Ref 10-63; Ref 10-64;Ref 10-62; Ref 10-65; Ref 10-66; Ref 10-67; Ref 10-55; Ref 10-68; Ref 10-56; Ref 10-59; Ref 10-57; Ref 10-51). This is discussed in more detail below in **Paragraph 10.8.42** and **Table 10-19**.

10.8.34 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 10-62; Ref 10-103; Ref 10-101; Ref 10-63; Ref 10-55). Research suggests that irregular impulsive 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 10-18**). 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 and the birds become habituated to new noise source. In addition, visual disturbance associated with construction activity will often create a disturbance effect before any associated noise starts to have an effect (Ref 10-55).

Table 10-18: Summary of noise disturbance studies

Study	Summary
IECS (Ref 10-62); IECS (Ref 10-66)	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

Study	Summary
	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 (Ref 10-103)	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 LA_{max} 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 LA_{max} F. Percussive piling noise over 83 dB LA_{max} F was considered likely to evoke a flight response.
Wright *et al* (Ref 10-101)	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 (Ref 10-63)	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.

Species sensitivity and response

10.8.35 Birds generally appear to habituate to continual noises as long as there is no large amplitude ‘startling’ component (Ref 10-104). With specific respect to piling, it has been concluded that although piling has the potential to create most 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 10-105). For example, observations as part of the construction work for ABB Power Generation Ltd (Pyewipe) suggested that it was the initial sudden bang during piling activities, which caused some localised disturbance, and that subsequent bangs typically resulted in reduced disturbance, demonstrating habituation (Ref 10-102).

10.8.36 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, Grey Plover and godwits generally showing stronger responses to disturbance stimuli than smaller waders (such as Turnstone and Dunlin) (Ref 10-56; Ref 10-57; Ref 10-58; Ref 10-55; Ref 10-59; Davidson and Rothwell, (Ref 10-106). A detailed review of the responses and sensitivity of key waterbird species to noise and visual disturbance is presented in **Table 10-19**. This includes data on flight initiation distance ("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.

10.8.37 The response to disturbance is also dependent 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 10-60; Ref 10-61; Ref 10-62; Ref 10-56).

10.8.38 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 10-92) 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).

Table 10-19: 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 10-55). 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 10-55). Goodship and Furness (Ref 10-57) 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. Goodship and Furness (Ref 10-59) undertook a disturbance literature review and assessed Shelduck	Moderate to high

Species	Sensitivity to noise and visual disturbance	
	Evidence on the sensitivity to disturbance stimuli	Sensitivity level[1]
	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.	
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 (Ref 10-55); Ref 10-107). Goodship and Furness (Ref 10-57) 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. Collop *et al., (Ref 10-56*) 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. Goodship and Furness (Ref 10-59) 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.	Moderate to high

Species	Sensitivity to noise and visual disturbance	
	Evidence on the sensitivity to disturbance stimuli	Sensitivity level[1]
Black-tailed Godwit	Disturbance responses have been recorded at distances over 100m from construction activity (Ref 10-55)). Goodship and Furness (Ref 10-57) 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 10-77) 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 10-116) 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	Moderate

Species	Sensitivity to noise and visual disturbance	
	Evidence on the sensitivity to disturbance stimuli	Sensitivity level[1]
	from their original position when a disturbance event occurred (Ref 10-115). Specifically on the Humber Estuary, Percival Ref 10-117) found that Black-tailed Godwits in the Humber Estuary appear to be tolerant of a relatively high disturbance environment. Percival (Ref 10-117) found that 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.	
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 10-55). Collop *et al., (Ref 10-56*) 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. Goodship and Furness (Ref 10-59) and Goodship and Furness (Ref 10-57) 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	Moderate

Species	Sensitivity to noise and visual disturbance	
	Evidence on the sensitivity to disturbance stimuli	Sensitivity level[1]
	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 10-118) found most disturbance responses to this species were within 150 m with limited responses at greater distances. Mayor *et al.,* (Ref 10-119) recorded a mean FID of 169m 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 10-55)). Collop *et al., (Ref 10-56*) recorded a minimum FID of 28m and a maximum FID of 187m (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. Goodship and Furness (Ref 10-57) 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. Goodship and Furness (Ref 10-59) undertook a disturbance literature review and assessed Redshank as being relatively sensitive to disturbance stimuli with the range in mean FID from the literature	Low to moderate

Species	Sensitivity to noise and visual disturbance	
	Evidence on the sensitivity to disturbance stimuli	Sensitivity level[1]
	reviewed of 24m to 137m as a result of the presence of people on or near the foreshore.	
Dunlin	Dunlin appear to be a species relatively 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 10-55)). Collop *et al., (Ref 10-56*) recorded a minimum FID of 9m 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 10-55)). Goodship and Furness (Ref 10-59) and Goodship and Furness (Ref 10-57) 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.	Low
Turnstone	Turnstone are considered not very sensitive to noise stimuli and habituate rapidly, especially in conjunction with visual stimuli. They are tolerant of	Low

Species	Sensitivity to noise and visual disturbance	
	Evidence on the sensitivity to disturbance stimuli	Sensitivity level[1]
	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 10-55). Collop *et al.,* (Ref 10-56) recorded a minimum FID of 5m and a maximum FID of 75 m (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. Goodship and Furness (Ref 10-59) 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.	

Species	Sensitivity to noise and visual disturbance	
	Evidence on the sensitivity to disturbance stimuli	Sensitivity level[1]
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.		

10.8.39 Collop *et al.,* (Ref 10-56) 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.

Review summary

10.8.40 Within the 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 10-50 Ref 10-51; Ref 10-52; Ref 10-53; Ref 10-54). 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 10-62; Ref 10-103; Ref 10-101; Ref 10-63; Ref 10-55).

10.8.41 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 10-60; Ref 10-61; Ref 10-62; Ref 10-56).

10.8.42 Distances over 300 m have been recorded more occasionally for some sensitive species such as Curlew or Shelduck (Ref 10-55); Ref 10-56; Ref 10-59; Ref 10-57). 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 10-63; Ref 10-64;Ref 10-62; Ref 10-65; Ref 10-66; Ref 10-67; Ref 10-55); Ref 10-68; Ref 10-57; Ref 10-56; Ref 10-59; Ref 10-51).

Project impact assessment

10.8.43 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 10.6** and **Table 10-15**. In an estuary wide context, numbers of most species recorded in this area were generally low. NE 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 2021/22). 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%.

10.8.44 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.

10.8.45 The evidence reviewed above suggests that 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 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 (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 10-77 for waterbirds generally including sensitive species such as Shelduck and also Gill *et al*., Ref 10-116 and Goodship and Furness (Ref 10-57) with specific respect to Black-tailed Godwit). Specifically for the Humber Estuary, Ross and Liley (Ref 10-68) 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.

10.8.46 The conclusions reached are supported by site specific evidence which suggests that birds continue to feed in the Port area within 200m of relatively noisy port activity and visual stimuli without being displaced 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 with bird numbers and distribution also on the local foreshore broadly comparable to what has been recorded in ongoing waterbird surveys in this area over the last five-years[17]. These birds appear to be tolerant of disturbance stimuli. A jack-up

[17] Coastal waterbird species (Dunlin, Redshank, Turnstone, Black tailed Godwit, Mallard, Shelduck, Herring Gull, Common Gull and Black-headed Gull) were all recorded actively feeding within 60 m of the jack-up-barge and closer on occasion. In addition, bird numbers and distribution in the eastern section of Sector B (i.e., the foreshore fronting Immingham Docks, from the lock gate towards the IOT Jetty) – where the GI

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.

10.8.47 With specific respect to noise stimuli, NE 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 10-52; Ref 10-108; Ref 10-55)).

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

10.8.49 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 head will occur at distances of more than 1km from the foreshore. In addition, capital dredging of the berth 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.

10.8.50 Ambient noise levels collected for the Applicant's separate 'Immingham Eastern Ro-Ro Terminal' ("IERRT") project (on the port land to the east and north of the Site Boundary) on the foreshore around the Port have been used in this assessment. Unattended noise measurements over five days in July 2022 suggest a range of ambient noise levels between 42 to 58 dB LAeq,1 hr and the existing range of Lmax noise levels is 48 to 84 dB *L*max. During percussive marine piling associated with the Project, 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 (**Figure 10.5 [TR030008/APP/6.3]**).

10.8.51 In addition, in order to better understand potential zones of disturbance, **Figure 10.6 [TR030008/APP/6.3]** presents a 200m buffer zone. The figure also shows MLWS and Mean Low Water Neaps ("MLWN") so that the extent of foreshore within and outside of the buffer under different tidal states can be better understood.

Works were undertaken for the period of the GI works were also broadly comparable to what has been recorded in ongoing waterbird surveys in this area over the last five-years. Therefore, in summary, coastal waterbirds tolerated the noise and visual stimuli associated with the GI works with only very limited disturbance observed and birds continued to utilise the foreshore in Sector B in similar numbers to previous years

10.8.52 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 relatively frequently during approach jetty construction on or near to the foreshore for any flocks present in this area.

10.8.53 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 10-19**). Less sensitive species such as Dunlin, Turnstone and gulls would be expected to be disturbed to a lesser degree and feed closer to construction activity.

10.8.54 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 200m 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.

10.8.55 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 also 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 10-92; Ref 10-109, Ref 10-110; Ref 10-56; Ref 10-111).

10.8.56 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 the approach jetty. However, the foreshore in the vicinity of the approach jetty is used by relatively low numbers of waterbirds. The magnitude of change for all commonly occurring waterbirds in the area is, therefore, considered to be low. The sensitivity of coastal waterbirds in the area is considered to range from low

to moderate-high depending on the species (**Table 10-19**). Importance is considered to be high for all species because of the protection afforded to coastal waterbirds. Therefore, the potential effects of temporary disturbance during construction in has been assessed as **minor adverse** (low sensitivity species) **to moderate adverse** (moderate to high sensitivity species).

Operation

10.8.57 This section contains an assessment of the potential impacts to ornithology receptors as a result of the operational phase of the Project. These effects have been reviewed in **Table 10-20**. This section includes an explanation of the rationale that was adopted for scoping in or out individual pathways for further assessment.

Table 10-20: Potential effects during operation scoped in/out of further detailed assessment

Receptor	Impact Pathways/Potential Effects	Project activity	Included in more detailed assessment?	Justification
Coastal waterbirds	Direct changes to intertidal foraging and roosting habitat as a result of marine infrastructure	Berth operations	Yes	Marine infrastructure associated with the Project (such as the raised jetty structure) could potentially cause direct damage or reduced functionality to waterbird feeding and roosting habitat. 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 rather than the direct loss of intertidal mudflat habitat due to the infrastructure (i.e. the piles) which would be assessed in the construction phase. 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 the disturbance pathway below. However, it is acknowledged that such effects are likely to be interrelated to some extent. This impact pathway is considered in more detail below.
	Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats	Berth operations	Yes	During operation, there is the potential for airborne noise and visual disturbance to affect coastal waterbirds. This impact pathway has, therefore, been scoped into the assessment.

10.8.58 This section contains an assessment of the potential impacts to coastal waterbird receptors as a result of the operational phase of the Project. The following impact pathways have been assessed:

a. Direct changes to intertidal foraging and roosting habitat as a result of the presence of the infrastructure; and

b. Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats.

Direct changes to intertidal foraging and roosting habitat as a result of the presence of infrastructure

10.8.59 For clarity it should be noted this pathway relates to potential changes to foraging and roosting habitat as a result of the physical presence of marine infrastructure. The direct loss of intertidal mudflat habitat due to the presence of the infrastructure (i.e. the piles) was assessed in the construction phase (**Paragraphs 10.8.10** to **10.8.18**).

10.8.60 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 the disturbance pathway below. However, it is acknowledged that such effects are likely to some extent to be interrelated.

General scientific context

10.8.61 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 10-73), 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 (assessed below in **Paragraphs 10.8.66** to **10.8.76**) (Ref 10-74).

10.8.62 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 10-75). 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 10-112; Ref 10-113; Ref 10-69). 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.

Project impact assessment

10.8.63 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 assessed in Section 9.8 of **Chapter 9: Nature Conservation (Marine Ecology) [TR030008/APP/6.2].**

10.8.64 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 IOT 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). 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 150 m 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.

10.8.65 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. On this basis, while the probability of some localised effects is likely to be high, the magnitude and consequent exposure to change will be low. The sensitivity of coastal waterbirds to direct changes to foraging and roosting habitat on the scale predicted is likely to be moderate and thus vulnerability will be low. Importance is high because of the protection afforded to coastal waterbirds. Consequently, the overall impact is assessed as **minor adverse**.

Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats

General scientific context

10.8.66 Operational ports, wherever located, inevitably act as a potential source of disturbance in the coastal environment. Waterbird monitoring work in the vicinity of port locations 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 10-76; Ref 10-51). For example, Ref 10-69 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 50m of the working infrastructure. Waterbirds have also been recorded regularly feeding under large industrial jetties as well as roosting on jetties and harbour walls.

10.8.67 Disturbance events have also been recorded as part of the ongoing IOH monitoring in the Port area since winter 2005/06[18]. This includes any potential disturbance due to operational activities on various jetties (such as the IOT (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.

10.8.68 In general, human presence on the foreshore (e.g., walking) is considered to cause greater disturbance than vehicles (Ref 10-52; Ref 10-53; Ref 10-62). 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 10-69). 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 10-77; Ref 10-78; Ref 10-69).

10.8.69 Disturbance events from powered vessels are typically 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 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 10-42; Ref 10-43; Ref 10-44; Ref 10-54).

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

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 10-76; Ref 10-114).

Project impact assessment

10.8.70 Operational disturbance stimuli could occur as a result of vessel movements associated with the Project. However, the berth during spring tide periods will be located approximately 1km from intertidal mudflat used by coastal waterbirds. On this basis, disturbance responses are considered highly unlikely due to vessel movements and berthing operations.

10.8.71 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 vehicle 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. This will include movement along the approach jetty which will be located above the intertidal mudflats. In general, human presence on the foreshore (e.g. walking) is considered to cause greater disturbance than vehicles (Ref 10-52; Ref 10-53; Ref 10-62). 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 10-69). 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 10-77; Ref 10-78; Ref 10-69).

10.8.72 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 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 (**Section 10.8**). Furthermore, pipe racks on one side of the approach jetty (which are no greater than 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.

10.8.73 Regarding engineering and maintenance works, this activity is expected to be limited and only required occasionally.

10.8.74 The level of response that waterbirds will have to operations 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 and Curlew. 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.

10.8.75 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.

10.8.76 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. Furthermore, the foreshore in the vicinity of the approach jetty is used by relatively low numbers of waterbirds. The magnitude and consequently exposure to change is, therefore, likely to be low. The sensitivity of coastal waterbirds in the area is considered to range from low to moderate depending on the species. This is because even species considered relatively sensitive to disturbance appear to show relatively limited responses to operational stimuli. Importance is high because of the protection afforded to coastal waterbirds. As a consequence, the impact of disturbance during operation has been assessed as **minor adverse**.

10.9 Mitigation and Enhancement Measures

Disturbance to coastal waterbirds during construction

10.9.1 In order to reduce the level of impact associated with noise and visual disturbance during construction (which was assessed on a worst case basis, as minor to moderate adverse), the following mitigation measures will be implemented during construction.

Winter marine construction restriction from 1 October to 31 March (approach jetty)

10.9.2 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 exposed intertidal foreshore during the period 1 October to 31 March inclusive. This restriction applies until an acoustic barrier/visual screen has been installed on both sides of the semi-completed structure. 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 exposed intertidal foreshore. With the addition of acoustic barriers, noise levels on the intertidal mudflat will be less than 70 dB(A) which is the range of existing background noise levels of operational port activities in the Port area.

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 area.

Soft starts

10.9.3 Using soft starts (as outlined in **Chapter 9: Nature Conservation (Marine Ecology [TR030008/APP/6.2]**) 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.

Cold weather construction restriction

10.9.4 Coastal waterbirds are considered particularly vulnerable to bird disturbance during periods of extreme winter weather. On this basis, it is proposed that a temporary cessation of all construction activity within 200m of exposed intertidal foreshore is implemented following seven consecutive days of freezing (zero or sub-zero temperature) weather conditions. The restriction should 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 JNCC scheme to reduce disturbance to waterfowl due to shooting activity during severe winter weather.

10.9.5 Taking into account the mitigation measures described above, the residual effects for noise and visual disturbance during construction on coastal waterbirds are assessed as **minor adverse** and **not significant**.

Loss of breeding bird habitat within Long Strip woodland (construction)

10.9.6 As set out in **Chapter 8: Nature Conservation (Terrestrial Ecology) [TR030008/APP/6.2]**, a compensation strategy for the loss of woodland (a UK Priority Habitat) will to be agreed with the local planning authority to ensure compliance with Local Planning Policy 41, which states that the council will seek to "..*minimise the loss of biodiversity features, or where loss is unavoidable and justified ensure appropriate mitigation and compensation measures are provided..".* An **Outline Woodland Compensation Strategy [TR030008/APP/6.8]** has been prepared. A woodland compensation plan would be developed in accordance with the Strategy (and is secured by a Requirement of the **draft DCO).**

10.10 Assessment of Residual Effects

Construction

10.10.1 The following sections summarise the likely effects on ornithology receptors. Potential effects on the following receptors during construction were assessed as significant:

a. Noise and visual disturbance on intertidal feeding and roosting during construction.

b. Loss of woodland supporting breeding non-SPA/Ramsar birds.

10.10.2 Specific mitigation measures are proposed with respect to noise and visual disturbance to coastal waterbirds during construction.

10.10.3 Without mitigation, potential effects due to disturbance were assessed as **minor to moderate adverse**. The residual effects on these receptors are assessed as **minor** and not significant following the implementation of the proposed mitigation measures.

10.10.4 The permanent loss of woodland of the age and structure of Long Strip providing habitat for nesting birds can only be compensated over the medium to long term. Compensatory woodland planting will be delivered by the **Outline Woodland Compensation Strategy [TR030008/APP/6.8]** and as described in **Section 10.9**. However, even with this compensation in place, given the time taken for the woodland to become established, the loss of breeding bird habitat is considered to be permanent for the purposes of this assessment. It is therefore assessed that the residual effect remains moderate adverse (**significant**).

10.10.5 All the other potential impacts on ornithology receptors have been assessed as **not significant**.

Operation

10.10.6 All potential impacts on ornithology receptors during operation have been assessed as **not significant**.

Decommissioning

10.10.7 The DCO will not make any provision for the decommissioning of the main elements of the marine infrastructure above and below water level. This is because the jetty, jetty head, loading platforms, access ramps and the jetty access road would, once constructed, become part of the fabric of the Port estate and would, in simple terms, continue to be maintained so that it can be used for port related activities to meet a long-term need. It is anticipated that plant and equipment on the jetty topside would be decommissioned in parallel with the decommissioning of the related landside elements. On this basis, potential effects on ornithology receptors (terrestrial and marine) from decommissioning have been scoped out.

10.11 Summary of Assessment

10.11.1 A summary of the impact pathways that have been assessed, together with the identified residual impacts and level of confidence is presented in **Table 10-21**.

Table 10-21: Summary of potential impact, mitigation measures and residual adverse effects

Receptor	Impact pathway	Impact Significance	Mitigation Measure	Residual Effect	Confidence
Construction Phase					
Coastal waterbirds	Direct loss to intertidal feeding and roosting habitat as a result of the piles	Insignificant	N/A	Insignificant	**High:** Baseline conditions and potential impacts on ornithology receptors are well understood
	Indirect changes to intertidal foraging and roosting habitat as a result of changes to hydrodynamic and sedimentary processes	Insignificant	N/A	Insignificant	**Medium;** The assessment is based on site specific data, and conceptual understanding of the study area combined with physical processes modelling. The numerical model is fully calibrated, however, it is recognised that such models represent a number of complex parameters within dynamic environments and as such there will always be a limit to the level of accuracy that can be achieved
	Airborne noise and visual disturbance to coastal	Minor to moderate	Winter marine construction restriction on approach jetty for works within 200m of	Minor	**High:** Good understanding of the potential effects of

Receptor	Impact pathway	Impact Significance	Mitigation Measure	Residual Effect	Confidence
	waterbirds using intertidal habitats		exposed foreshore (1 October to 31 March) Noise suppression system for marine marine piling Acoustic barrier/visual screen on approach jetty from 1 October to 31 March Apply soft start procedures during marine marine piling Cold weather construction restriction (all construction activity)		disturbance and effectiveness of proposed mitigation based on site specific data and evidence from background literature.
Breeding birds (non-SPA/ Ramsar)	Permanent loss of woodland habitat within Long Strip	Moderate adverse	Compensation for loss of woodland to be agreed; like-for-like replacement would take longer to establish than the lifetime of this Project (which is anticipated to be 25 years for the operation of the terrestrial elements of the Project).	Moderate adverse Significant	**Medium**: likely to be some displacement of nesting pairs to surrounding habitats rather than total loss of all nesting species.
Operational Phase					
Coastal waterbirds	Direct changes to foraging and roosting habitat as a result of the presence of infrastructure	Minor	N/A	Minor	**Medium:** Generally good understanding of the potential effects based on site specific data and evidence from background literature.

Receptor	Impact pathway	Impact Significance	Mitigation Measure	Residual Effect	Confidence
	Airborne noise and visual disturbance to coastal waterbirds using intertidal habitats	Minor	N/A	Minor	**High**: Good understanding of the potential effects of disturbance and effectiveness of proposed mitigation based on site specific data and evidence from background literature.

10.12 References

Ref 10-1 European Commission Office (2014). Environmental Impact Assessment (EIA) Regulations, the EIA Directive (2014/52/EU)

Ref 10-2 Institute of Environmental Management and Assessment (IEMA). (2017). Delivering Proportionate EIA

Ref 10-3 Chartered Institute of Ecology and Environmental Management (CIEEM). (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland. [Online] Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf

Ref 10-4 European Commission (1992). Council Directive 92 /43 /EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

Ref 10-5 European Commission (2009). Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds.

Ref 10-6 European Commission (2000). Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

Ref 10-7 The Stationery Office (2017a). Statutory Instrument 2017. No. 1012. The Conservation of Habitats and Species Regulations 2017.

Ref 10-8 The Stationery Office Limited (2019a). Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

Ref 10-9 The Stationery Office (2017b). Statutory Instrument 2017 No. 407. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

Ref 10-10 The Stationery Office Limited (2009). Marine and Coastal Access Act 2009.

Ref 10-11 The Stationery Office Limited (2019b) The Floods and Water (Amendment etc.) (EU Exit) Regulations.

Ref 10-12 The Stationery Office (2008). Planning Act 2008.

Ref 10-13 The Stationery Office (1981). Wildlife and Countryside Act 1981.

Ref 10-14 The Stationery Office (2000). The Countryside and Rights of Way Act 2000.

Ref 10-15 The Stationery Office (2006). Natural Environment and Rural Communities Act 2006.

Ref 10-16 Department for Transport (2012). The National Planning Policy Statement for Ports.

Ref 10-17 The Stationery Office Limited (2011). UK Marine Policy Statement.

Ref 10-18 HM Government (2014). East Inshore and East Offshore Marine Plans.

Ref 10-19 North East Lincolnshire Council (2018). North East Lincolnshire Local Plan.

Ref 10-20 Austin, E.G., Calbrade, N.A., Birtles, G.A., Peck, K., Wotton, S.R., Shaw, J.M., Balmer, D.E and Frost, T.M (2023). Waterbirds in the UK 2021/22: The Wetland Bird Survey and Goose & Swan Monitoring Programme. BTO, RSPB, JNCC and NatureScot. British Trust for Ornithology, Thetford.

Ref 10-21 Natural England. (2021b). Natural England Conservation Advice for Marine Protected Areas: Humber Estuary SPA. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9006111&SiteName=humber&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&HasCA=1&NumMarineSeasonality=15&SiteNameDisplay=Humber%20Estuary%20SPA (accessed July 2021).

Ref 10-22 Woodward, I.D., Frost, T.M., Hammond, M.J., and Austin, G.E. (2019a). Wetland Bird Survey Alerts 2016/2017: Changes in numbers of wintering waterbirds in the Constituent Countries of the United Kingdom, Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Areas of Special Scientific interest (ASSIs). BTO Research Report 721. BTO, Thetford.

Ref 10-23 Woodward, I.D., Calbrade, N.A and Austin G.E. (2018). Analysis of Wetland Bird Survey (WeBS) Data for The Humber Estuary SSSI, SAC, SPA and Ramsar site: Third appraisal – sector-level trends to winter 2016/17.

Ref 10-24 JNCC, (2022a). https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030170.pdf. Accessed 4 March 2022

Ref 10-25 JNCC, (2022b). https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006111.pdf Accessed 4 January 2022.

Ref 10-26 JNCC, (2022c). https://jncc.gov.uk/jncc-assets/RIS/UK11031.pdf Accessed 4 January 2022.

Ref 10-27 JNCC (2022d). https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9020329.pdf Accessed 28 January 2022.

Ref 10-28 Mander, L., Scapin, L., Thaxter, C.B., Forster, R.M., & Burton, N.H. (2021). Long-Term Changes in the Abundance of Benthic Foraging Birds in a Restored Wetland. Frontiers in Ecology and Evolution, 584.

Ref 10-29 Camphuysen, C. J., & Webb, A. (1999). Multi-species feeding associations in North Sea seabirds: jointly exploiting a patchy environment. ARDEA-WAGENINGEN-, 87(2), 177-198.

Ref 10-30 Stillman, R.A., West, A.D., Goss-Custard, J.D., McGrorty, S., Frost, N.J., Morrisey, D.J., Kenny, A.J. and Drewitt, A.L. (2005). Predicting site quality for shorebird communities: a case study on the Humber estuary, UK. Marine Ecological Progress Series, 305, pp.203–217.

Ref 10-31 Woodward, I.D., Calbrade, N.A and Holt., C.A. (2014). Humber Estuary Bird Decline Investigation 2014. BTO Research Report No. 668. Report of work carried out by The British Trust for Ornithology under contract to Natural England.

Ref 10-32 RSPB. (2021). https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/. Accessed October 2021.

Ref 10-33 Natural England (2022). Natural England Designated Sites Viewer. Available at: (https://designatedsites.naturalengland.org.uk/)

Ref 10-34 Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P (2019b). Desk-based revision of seabird foraging ranges used for HRA screening, Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate, ISBN 978-1-912642-12-0

Ref 10-35 Austin, G and Ross-Smith, V. (2014). Guidance to Interpretation of Wetland Bird Survey Within-Site Trends. BTO Research Report No. 661.

Ref 10-36 British Trust for Ornithology (2022a) Threshold Levels. Available at: https://www.bto.org/volunteer-surveys/webs/data/species-threshold-levels. Accessed 4 April 2022.

Ref 10-37 British Trust for Ornithology (2022b) The Wetland and Bird Survey. Available at: https://app.bto.org/websonline/sites/data/sites-data.jsp#lon=-0.1652575&lat=53.6215984&zoom=14&type=BING

Ref 10-38 British Trust for Ornithology (2022c). Abbreviated Code List. Available at: https://www.bto.org/sites/default/files/u10/downloads/taking-part/species_codes.pdf

Ref 10-39 Casey, C., Clarkson, J.R., Espin, P. and Hyde, P.A. (2021) Birds of Lincolnshire. Published by the Lincolnshire Bird Club

Ref 10-40 Marine Climate Change Impact Partnership (MCCIP). (2020). Marine Climate Change Impacts: Report Card 2020.

Ref 10-41 Fuller, R.J. (1980) A method for assessing the ornithological interest of sites for nature conservation. British Trust for Ornithology, Hertfordshire, UK.

Ref 10-42 Rodgers, J.A., and Schwikert, S.T., (2002). Buffer-Zone Distances to Protect Foraging and Loafing Waterbirds from Disturbance by Personal Watercraft and Outboard-Powered Boats. Conservation Biology, 16(1), 216-224.

Ref 10-43 Burger, J. and Gochfeld, M. (1998). Effects of ecotourists on bird behaviour at Loxahatchee National Wildlife Refuge, Florida. Environmental Conservation, 25, 13-21

Ref 10-44 Schwemmer, P., Mendel, B., Sonntag, N., Dierschke, V., and Garthe, S. (2011) Effects of ship traffic on seabirds in offshore waters: implications for marine conservation and spatial planning. Ecological Applications, 21(5), 1851-1860.Aage, C., Bell, A.K., Bergdahl, L., Blume, A., Bolt, E., Esterbarkey, H., Tetsuya, H., Kofoed-Hansen, H., Maly, D., Single, M. and Rytkönen, J. (2003). Guidelines for managing wake wash from high-speed vessels. PIANC.

Ref 10-45 Kaiser, M.J. (2002) Predicting the Displacement of the Common Scoter Melanitta nigra from Benthic Feeding Areas due to Offshore Windfarms. COWRIE Report COWRIE-BEN-03-2002, 68pp.

Ref 10-46 Garthe, S. and Hüppop, O. (2004) Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of applied Ecology, 41(4), 724-734.

Ref 10-47 Helsinki Commission (HELCOM) (2013) HELCOM Red List Bird Expert Group 2013. 205p. Available at: HELCOM-RedList-All-SIS_Birds.pdf . Accessed March 2022.

Ref 10-48 Defra MAGIC (2022) Multi-Agency Geographic Information for the Countryside (MAGIC) Available at: https://magic.defra.gov.uk/MagicMap.aspx

Ref 10-49 Gov (2022) Priority Habitat Inventory. Available at: https://data.gov.uk/dataset/4b6ddab7-6c0f-4407-946e-d6499f19fcde/priority-habitat-inventory-england

Ref 10-50 Institute of Estuarine and Coastal Studies (IECS). (1997). Saltend Development Cumulative Impact Study: Ornithological Impacts. Report to Consultants in Environmental Sciences Ltd. Report No. ZO80-97-F. IECS, University of Hull, 28p.

Ref 10-51 ABPmer. (2013). Bury Marsh Bird Monitoring 2012-2014: Interim Report. ABP Marine Environmental Research Ltd, Report No. R.2123.

Ref 10-52 McLeod, E. M., Guay, P. J., Taysom, A. J., Robinson, R. W., & Weston, M. A. (2013). Buses, cars, bicycles and walkers: the influence of the type of human transport on the flight responses of waterbirds. PLoS One, 8(12), e82008.

Ref 10-53 Guay, P.J., McLeod, E.M., Taysom, A.J., and Weston, M.A. (2014). Are vehicles 'mobile bird hides'?: A test of the hypothesis that 'cars cause less disturbance'. The Victorian Naturalist 131, pp.150-155.

Ref 10-54 Glover, H.K., Guay, P.J., and Weston, M.A. (2015). Up the creek with a paddle; avian flight distances from canoes versus walkers. Wetlands Ecology and Management, pp.1-4.

Ref 10-55 Institute of Estuarine and Coastal Studies (IECS) (2013). Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects.

Ref 10-56 Collop, C., Stillman, R.A., Garbutt, A., Yates, M.G., Rispin, E., and Yates, T. (2016). Variability in the area, energy and time costs of wintering waders responding to disturbance. Ibis, 158(4), pp.711-725.

Ref 10-57 Goodship, N.M. and Furness, R.W. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 128

Ref 10-58 Calladine J.R., Park, K.J, Thompson, K. and Wernham, C.V. (2006). Review of Urban Gulls and their Management in Scotland. A report to the Scottish Executive.

Ref 10-59 Goodship, N. & Furness, R.W. (2019). Seaweed hand-harvesting: literature review ofdisturbance distances and vulnerabilities of marine and coastal birds. Scottish Natural Heritage Research Report No. 1096

Ref 10-60 Gill, J.A., Norris, K. and Sutherland, W.J. (2001a). Why behavioural responses may not reflect the population consequences of human disturbance. Biological Conservation, 97, pp.265-268.

Ref 10-61 Mullner, A., Linsenmair, K.E. and Wikelski, M. (2004). Exposure to ecotourism reduces survival and effects stress response in hoatzin chicks (Opisthocomus hoazin). Biological Conservation, 118, pp.549-558.

Ref 10-62 Institute of Estuarine and Coastal Studies (IECS). (2009a). Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies Report to Humber INCA.

Ref 10-63 ABPmer. (2002). ABP Teignmouth Quay Development Environmental Statement. ABP Marine Environmentrosrtal Research Ltd, Report No. R.984a.

Ref 10-64 Ruddock, M. and Whitfield, D.P. (2007). A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

Ref 10-65 Scott Wilson, (2009). Estuarine Bird Monitoring (05 Dec 2008-19 Jan 2009) - TERRC Facility. Prepared for Hartlepool Borough Council.

Ref 10-66 Institute of Estuarine and Coastal Studies (IECS). (2009b). Ornithological Monitoring, Saltend: Summary Trend Report #33 January 2007 to March 2007 Late Winter. Report to ABP Port of Hull. IECS, University of Hull.

Ref 10-67 Dwyer, R.G. (2010). Ecological and anthropogenic constraints on waterbirds of the Forth Estuary: population and behavioural responses to disturbance. Thesis submitted as candidature for the degree of Doctor of Philosophy Centre for Ecology and Conservation.

Ref 10-68 Ross, K and Liley, D, (2014). Humber Winter Bird Disturbance Study. Unpublished report for the Humber Management Scheme by Footprint Ecology

Ref 10-69 Cutts, N.D (2021), Nseleni Independent Floating Power Plant (NIFPP) EIA. Provision of Professional Opinion on Waterbird Disturbance Potential: Audible and Visual Stimuli Impacts and Mitigation Measures. Cutts & Hemingway Estuarine Ecology and Management Ltd. (CHEEM), UK. Report to SE Solutions (Pty) Ltd, South Africa; Report No. CHEEM019-F2-2021.

Ref 10-70 Wright, L.J., Mendez, V., and Burton, N.H. (2014). Review of knowledge regarding the effect of major estuarine developments on bird populations with reference to proposals for an airport in the Thames Estuary. British Trust for Ornithology.

Ref 10-71 Méndez, V., Gill, J.A., Alves, J.A., Burton, N.H., and Davies, R.G. (2018). Consequences of population change for local abundance and site occupancy of wintering waterbirds. Diversity and Distributions, 24(1), pp.24-35.

Ref 10-72 Burton, N. H. (2000). Winter site-fidelity and survival of Redshank Tringa totanus at Cardiff, south Wales. Bird Study, 47(1), 102-112.

Ref 10-73 Milsom, T. P., Ennis, D. C., Haskell, D. J., Langton, S. D., & McKay, H. V. (1998). Design of grassland feeding areas for waders during winter: the relative importance of sward, landscape factors and human disturbance. Biological Conservation, 84(2), 119-129.

Ref 10-74 Walters, K., Kosciuch, K. & Jones, J. (2014). Can the effect of tall structures on birds be isolated from other aspects of development? Wildlife Society Bulletin DOI:10.1002/wsb.394.

Ref 10-75 Naylor, L. A., MacArthur, M., Hampshire, S., Bostock, K., Coombes, M. A., Hansom, J. D., ... & Folland, T. (2017). Rock armour for birds and their prey: ecological enhancement of coastal engineering. In Proceedings of the Institution of Civil Engineers-Maritime Engineering (Vol. 170, No. 2, pp. 67-82). Thomas Telford Ltd.

Ref 10-76 ABPmer, (2015). Bird Disturbance Monitoring of the 'RWE Pontoon' at the Port of Mostyn: Review of Two Year Monitoring Programme (2013 to 2015). ABP Marine Environmental Research Ltd, Report No. R.2320.

Ref 10-77 Burton, N. H., Armitage, M. J., Musgrove, A. J., & Rehfisch, M. M. (2002b). Impacts of man-made landscape features on numbers of estuarine waterbirds at low tide. Environmental Management, 30(6), 0857-0864.

Ref 10-78 Natural England (2017).Natural England Evidence Information Note EIN033: motorised and non-motorised land vehicles

Ref 10-79 Ma, T., Li, X., Bai, J., & Cui, B. (2019). Habitat modification in relation to coastal reclamation and its impacts on waterbirds along China's coast. Global Ecology and Conservation, 17, e00585.

Ref 10-80 Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F., Stamp, T. (2018). Marine Evidence-based Sensitivity Assessment (MarESA) – A Guide. Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth, p. 91. [Online] Available at: https: / / www.marlin.ac.uk/publications (accessed December 2020)

Ref 10-81 Mander, L., Marie-Orleach, L., and Elliott, M. (2013). The value of wader foraging behaviour study to assess the success of restored intertidal areas. Estuarine, Coastal and Shelf Science, 131, pp.1-5.

Ref 10-82 Bowgen, K.M. (2016). Predicting the effect of environmental change on wading birds: insights from individual-based models.

Ref 10-83 Santos, T.M., Cabral, J.A., Lopes, R.J., Pardal, M., Marques, J.C. and Goss-Custard, J. (2005). Competition for feeding in waders: A case study in an estuary of south temperate Europe (Mondego, Portugal). Hydrobiologia. 544(1), pp.155–166.

Ref 10-84 Gunnarsson, T. G., Gill, J. A., Petersen, A., Appleton, G. F. and Sutherland, W. J. (2005). A double buffer effect in a migratory shorebird population. Journal of Animal Ecology, 74(5), pp.965–971.

Ref 10-85 Institute of Environmental Management and Assessment (IEMA) (2016). Environmental Impact Assessment Guide to: Delivering Quality Development. Available at: https://www.iema.net/assets/newbuild/documents/Delivering%20Quality%20Development.pdf (accessed February 2022).

Ref 10-86 Burton, N.H.K., Rehfisch, M.M., Clark, N.A. and Dodd, S.G. (2006). Impacts of sudden winter habitat loss on the body condition and survival of redshank Tringa totanus. Journal of Applied Ecology, 43, pp.464–473.

Ref 10-87 Lambeck, R.H.D. (1991). Changes in abundance, distribution and mortality of wintering oystercatchers after habitat loss in the Delta Area, SW Netherlands. Acta XX Congressus Internationalis, 4, pp.2208–2218.

Ref 10-88 Burton, N.H., Rehfisch, M.M., and Clark, N.A. (2002a). Impacts of disturbance from construction work on the densities and feeding behavior

of waterbirds using the intertidal mudflats of Cardiff Bay, UK. Environmental Management, 30(6), pp.0865-0871.

Ref 10-89 Coleman, R.A., Salmon, N.A and Hawkins, S.J. (2003). Sub-dispersive human disturbance of foraging oystercatchers Haematopus ostralegus. Ardea, 91, pp.263-268.

Ref 10-90 Belanger, L. and Bedard, J. (1990). Energetic cost of man-induced disturbance to staging snow geese. Journal of Wildlife Management, 54, pp.36-41.

Ref 10-91 Durell, S.E.A. le V. dit, Stillman, R.A., Triplet, P., Aulert, C., Bio, D.O. dit, Bouchet, A., Duhamel, S., Mayot, S. and Goss-Custard, J.D. (2005). Modelling the efficacy of proposed mitigation areas for shorebirds: a case study on the Seine estuary, France. Biological Conservation, 123, pp.67–77.

Ref 10-92 Goss-Custard, J.D., Triplet, P., Sueur, F., and West, A.D. (2006). Critical thresholds of disturbance by people and raptors in foraging wading birds. Biological Conservation, 127(1), pp.88-97.

Ref 10-93 Goss-Custard, J. D., Hoppe, C. H., Hood, M. J., and Stillman, R. A. (2020). Disturbance does not have a significant impact on waders in an estuary close to conurbations: importance of overlap between birds and people in time and space. Ibis, 162(3), pp.845-862.

Ref 10-94 Liley, D., Stillman, R. and Fearnley, H. (2010). The Solent Disturbance and Mitigation Project Phase II: Results of Bird Disturbance Fieldwork 2009/10. Footprint Ecology/Solent Forum.

Ref 10-95 Linssen., H., Van De Pol, M., Allen, A.M., Jans, M., Ens, B.J., Krijsveld, K.L., Frauendorf, M and Van der Kolk, H.J. (2019). Disturbance increases high tide travel distance of roosting shorebird but only marginally effects daily expenditure. Avian Research, 10(1), pp.1-11.

Ref 10-96 Martín, B., Delgado, S., Cruz, A., Tirado, S., and Ferrer, M. (2014). Effects of human presence on the long-term trends of migrant and resident shorebirds: evidence of local population declines. Animal Conservation, 18, pp.73–81.

Ref 10-97 Navedo, J.G., and Herrera, A.G. (2012). Effects of recreational disturbance on tidal wetlands: supporting the importance of undisturbed roosting sites for waterbird conservation. Journal of Coastal Conservation, 16(3), pp.373-381.

Ref 10-98 Rees, B.C., Bruce, J.H. and White, G.T. (2005). Factors affecting the behavioural responses of whooper swans (Cygnus c. Cygnus) to various human activities. Biological Conservation, 121, pp.369-382.

Ref 10-99 Stillman, R.A., West, A.D., Caldow, R.W., and Durell, S.E.L.V. (2007). Predicting the effect of disturbance on coastal birds. Ibis, 149(1), pp.73-81.

Ref 10-100 Stillman, R.A., West, A.D., Clarke, R.T. and Liley, D. (2012). Solent Disturbance and Mitigation Project Phase II: Predicting the impact of human disturbance on overwintering birds in the Solent. Report to the Solent Forum.

Ref 10-101 Wright, M.D., Goodman, P., and Cameron, T.C. (2013). Exploring behavioural responses of shorebirds to impulsive noise. Wildfowl, 60(60), pp.150-167.

Ref 10-102 ERM. (1996). South Humber Power Station, Pyewipe, Bird Monitoring Study, April 1996.

Ref 10-103 Xodus. (2012). Grimsby River Terminal Construction Pile Noise Monitoring and Bird Behaviour Observations. Associated British Ports.

Ref 10-104 Hockin, D., Ounsted, M., Gorman, M., Keller, V., and Barker, M.A. (1992). Examination of the effects of disturbance of birds with reference to its importance in ecological assessments. Journal of Environmental Management. 36, pp.253-286.

Ref 10-105 ABP Research. (2001). ABP Grimsby & Immingham, Immingham Outer Harbour Environmental Statement. ABP Research & Consultancy Ltd, Report No. R.903.

Ref 10-106 Davidson, N. C., & Rothwell, P. I. (1993). Human disturbance to waterfowl on estuaries: conservation and coastal management implications of current knowledge. Wader study group bulletin, 68, 97-105.

Ref 10-107 Lausen K.L., J. Kahlert & J. Frikke (2005). Factors affecting escape distances of staging waterbirds. Nordic Board for Wildlife Research.

Ref 10-108 Smit, C.J. & Visser, G.J. (1993) . Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area. Wader Study Group Bull. 68: 6-19.

Ref 10-109 JNCC. (2021). https://jncc.gov.uk/our-work/severe-weather-scheme/ Accessed November 2021.

Ref 10-110 RSPB. (2010). http://ww2.rspb.org.uk/our-work/rspb-news/news/267825-its-snow-joke-for-birds-on-thehumber?utm_source=rss&utm_medium=feed&utm_campaign=News. Accessed November 2021.

Ref 10-111 Davidson, N. C., & Rothwell, P. I. (1993). Human disturbance to waterfowl on estuaries: conservation and coastal management implications of current knowledge. Wader study group bulletin, 68, 97-105.

Ref 10-112 Jackson, M.V., Woodworth, B.K., Bush, R., Clemens, R.S., Fuller, R.A., Garnett, S.T., Lilleyman, A., Maron, M., Purnell, C., Rogers, D.I. and Amano, T., 2021. Widespread use of artificial habitats by shorebirds in Australia. Emu-Austral Ornithology, pp.1-10.

Ref 10-113 Jackson, M. V. (2017). Literature Review: Importance of artificial roosts for migratory shorebirds. Report to Charles Darwin University. Charles Darwin University: Darwin.

Ref 10-114 ABPmer (2021). Bathside Bay Bird Monitoring, First Annual Report – September 2020 to June 2021, ABPmer Report No. R.3714. A report produced by ABPmer for Galloper Wind Farm Limited, October 2021.

Ref 10-115 Sexton, C. (2017). Influence of the disturbance on shorebird behaviour. BSc thesis, University College Cork, Ireland.

Ref 10-116 Gill, J.A., Norris, K. and Sutherland, W.J. (2001b). The effects of disturbance on habitat use by black-tailed godwits Limosa limosa. Journal of Applied Ecology 38: 846-856.

Ref 10-117 Percival, S. (2011). Spatial and temporal patterns in black-tailed godwit use of the Humber Estuary, with reference to historic planning and development at Killingholme Pits. Report by Ecology Consulting

Ref 10-118 Bregnballe, T., Speich, C., Horsten, A., & Fox, A. D. (2009). An experimental study of numerical and behavioural responses of spring staging dabbling ducks to human pedestrian disturbance. Wildfowl, 131-142.

Ref 10-119 Mayer, M., Natusch, D., & Frank, S. (2019). Water body type and group size affect the flight initiation distance of European waterbirds. PLoS One, 14(7), e0219845.