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10.0 ECOLOGY

10.1 Introduction

10.1.1 This chapter of the Environmental Statement (ES) addresses the potential effects of the Proposed Development on ecology features.

10.1.2 The ecological impact assessment considers:

- the present-day and future baseline conditions at the Site;
- the effects of construction of the Proposed Development on habitats and species, with respect to construction traffic, construction dust and the Proposed Development footprint;
- the effects of the operation and maintenance of the Proposed Development on habitats and species; and
- the potential effects of decommissioning of the Proposed Development on habitats and species.

10.1.3 The cumulative environmental effects of the Proposed Development and other committed developments in the vicinity are described in Chapter 17: Cumulative and Combined Effects of this ES.

10.1.4 This chapter is supported by the following technical appendices, provided in ES Volume III:

- Appendix 10A – Planning Policy and Legislation;
- Appendix 10B – Ecological Impact Assessment Method;
- Appendix 10C – Preliminary Ecological Assessment (PEA);
- Appendix 10D – Aquatic Invertebrate Survey;
- Appendix 10E – Otter and Water Vole Survey;
- Appendix 10F – Reptile Survey; and
- Appendix 10G – Habitats Regulations Assessment Signposting Report.

10.2 Legislation and Planning Policy Context

10.2.1 The ecological impact assessment (EcIA) presented in this chapter has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. A summary of these are provided below, and further details are included in Appendix 10A in ES Volume III.

Legislative Background

10.2.2 The following legislation is considered relevant to the Proposed Development:

- Wildlife and Countryside Act (WCA) 1981 (as amended);
- Countryside and Rights of Way (CRoW) Act 2000 (as amended);
- Natural Environment and Rural Communities (NERC) Act 2006 (as amended);
- The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations);
- Protection of Badgers Act 1992 (as amended);

- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD); and
- Animal Welfare Act 2006.

National Planning Policy

10.2.3 The UK Government has committed to halting the overall decline in biodiversity. Planning requirements in support of this are specified in the National Planning Policy Framework (NPPF) published by the Ministry for Housing, Communities and Local Government in July 2018.

10.2.4 The NPPF states the commitment of the UK Government to minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity. It specifies the obligations that Local Authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation, and how this is to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where an impact is unavoidable, compensation may be required.

Local Development Plan Policy

10.2.5 Local planning policy relevant to ecology and nature conservation is set out in the North East Lincolnshire Local Plan, which was adopted by North East Lincolnshire Council (NELC) in 2018 and sets out a long-term vision for managing growth and development in the area up to 2032.

10.2.6 Policy 41 (Biodiversity and Geodiversity) relates to the protection of statutory and non-statutory designated sites, biodiversity features and the borough's ecological network.

10.2.7 Policy 9 (Habitat Mitigation – South Humber Bank) sets out the approach to delivering mitigation within the Local Plan area for the loss of wintering bird habitat that is functionally linked to the Humber Estuary internationally designated site. Within the Mitigation Zone identified on the policies map, development proposals on greenfield land that adversely affect the Humber Estuary Special Protection area (SPA)/ Ramsar site due to the loss of functionally linked land will be required to make contributions towards the provision and management of the mitigation sites identified. This is secured on a proportional approach relating to the site area. The Proposed Development lies within the Mitigation Zone, and therefore this policy will apply to the delivery of mitigation for wintering birds.

Other Guidance

10.2.8 In July 2012, the UK Post-2010 Biodiversity Framework was published by the Joint Nature Conservation Committee and the Department for the Environment, Food and Rural Affairs (Defra). This covers the period 2011 - 2020 and forms the UK Government's response to the UN Convention on Biological Diversity held in Nagoya in 2010. Following publication of the Framework, most of the strategic biodiversity work previously enacted under the UK Biodiversity Action Plan was delegated to each of the four countries comprising the United Kingdom of Great Britain and Northern Ireland. The Framework shows how the work of the four UK countries joins up to achieve the international biodiversity targets agreed under the UN Convention, as well those required under the European Union biodiversity strategy.

10.2.9 In England, the strategic approach to be taken in biodiversity planning over the period 2010 to 2020 is set out in '*Biodiversity 2020, A strategy for England's wildlife and*

ecosystem services' (Defra, 2011). These country strategies replace the UK Biodiversity Action Plan, with the associated lists of priority habitats and species carried over into the newly defined lists of habitats and species of principal importance for nature conservation in England contained within Section 41 of the NERC Act. This latter list encompasses 56 habitats and 943 species.

10.2.10 The Local Biodiversity Action Plan (LBAP) for Lincolnshire is a nature conservation strategy identifying threats to habitats and species within the county and setting out the actions necessary to conserve them through a series of Habitat Action Plans (HAPs) and Species Action Plans (SAPs).

10.2.11 Standing advice has been published by Natural England and Defra to guide decision-makers on the determination of proposals with the potential to affect designated sites, species and habitats. The guidance sets out responsibilities and minimum requirements for survey and mitigation, including the need to engage with objectives for no net loss of biodiversity and provision of biodiversity net gain.

10.3 Assessment Methodology

10.3.1 The EcIA presented in this chapter has been undertaken in accordance with best practice guidance issued by the Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2018). Full details of the approach applied are provided in Appendix 10B: Ecological Impact Assessment Methodology in ES Volume III, with an abridged overview provided below. The aims of the ecological impact assessment are to:

- identify relevant ecological features (i.e. designated sites, habitats, species or ecosystems) which may be impacted as a consequence of the Proposed Development;
- provide a robust assessment of the likely ecological impacts and resultant effects of the Proposed Development, which may be beneficial (i.e. positive) or adverse (i.e. negative);
- facilitate determination of the consequences of the Proposed Development in terms of national, regional and local policies relevant to nature conservation and biodiversity, where the level of detail provided is proportionate to the scale of the development and the complexity of its potential impacts; and
- set out the steps to be taken to adhere to legal requirements relating to the relevant ecological features concerned.

10.3.2 It is not necessary in the assessment to address all habitats and species with potential to occur in the zone of influence of a proposed development. Instead, the focus should be on those that are 'relevant'. CIEEM guidance makes it clear that there is no need to "*carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable*". This does not mean that efforts should not be made to safeguard wider biodiversity and requirements for this have been considered. National policy documents emphasise the need to achieve no net loss of biodiversity and enhancement of biodiversity.

10.3.3 To support focussed EcIA, there is a need to determine the scale at which the ecological features identified through the desk studies and field surveys undertaken for the Proposed Development are of value. The value of each ecological feature has been defined with reference to the geographical level at which it matters, and the results of this assessment have been used to identify the relevant features requiring impact assessment. The frames of reference used for this assessment, based on CIEEM guidance, are:

- International (generally this is within a European context, reflecting the general availability of good data to allow cross-comparison);
- National (Great Britain, but considering the potential for certain ecological features to be more notable (of higher value) in an England context relative to Great Britain as a whole);
- Regional (South Humberside);
- County (Greater Lincolnshire);
- District (Stallingborough);
- Local (ecological features that do not meet criteria for valuation at a District or higher level, but that have sufficient value to merit retention or mitigation); and
- Negligible (common and widespread ecological features of such low priority that they do not require retention or mitigation at the relevant location to otherwise maintain a favourable nature conservation status).

10.3.4 All ecological features of Local value and above have been taken forward to impact assessment, and are the 'relevant ecological features' for the purposes of impact assessment.

10.3.5 In line with the CIEEM guidelines, the terminology used within the EcIA draws a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EcIA, these terms are defined as follows:

- impact – actions resulting in changes to an ecological feature; for example, demolition activities leading to the removal of a building utilised as a bat roost; and
- effect – outcome resulting from an impact, acting upon the conservation status or structure and function of an ecological feature; for example, killing/injury of bats and reducing the availability of breeding habitat as a result of the loss of a bat roost may lead to an adverse effect on the conservation status of the population concerned.

Significance Criteria

10.3.6 For each ecological feature only those characteristics relevant to understanding the ecological effect and determining the significance are described. The determination of the significance of effects has been made based on the predicted effect on the structure and function, or conservation status, of relevant ecological features, as follows:

- not significant - no effect on structure and function, or conservation status; and
- significant - structure and function, or conservation status is affected.

10.3.7 For significant effects (both adverse and beneficial) this is qualified with reference to the geographic scale at which the effect is significant (e.g. an adverse effect significant at a national level).

10.3.8 The CIEEM approach described in Appendix 10B: Ecological Impact Assessment Method in ES Volume III broadly accords with the EIA methodology described in Chapter 2: Assessment Methodology of this ES. However, the matrix has not been used to classify effects, as this deviates from CIEEM guidance. In order to provide consistency of terminology in the final assessment, the findings of the CIEEM assessment have been translated into the classification of effects scale used in other chapters of the ES as outlined in Table 10.1 below.

Table 10.1: Relating CIEEM Assessment Terms to those used in other ES Chapters

EFFECT CLASSIFICATION	TERMINOLOGY USED IN OTHER ES CHAPTERS	EQUIVALENT CIEEM ASSESSMENT
Significant (beneficial)	Major beneficial	Beneficial effect on structure/function or conservation status at regional, national or international level.
	Moderate beneficial	Beneficial effect on structure/function or conservation status at District or County level.
Non-significant	Minor beneficial	Beneficial effect on structure/function or conservation status at Site or Local level.
	Neutral	No effect on structure/function or conservation status.
	Minor adverse	Adverse effect on structure/function or conservation status at Site or Local level.
Significant (adverse)	Moderate adverse	Adverse effect on structure/function or conservation status at District or County level.
	Major adverse	Adverse effect on structure/function or conservation status at Regional, National or International level.

Survey Methods and Scope

Extent of Study Area

10.3.9 The study areas used in this assessment were defined with reference to the likely zone of influence over which the Proposed Development may have potential to result in significant effects on relevant ecological features.

10.3.10 It is important to recognise that the potential zone of influence of the Proposed Development may vary over time (e.g. the construction zone of influence may differ from the operational zone of influence) and/or depending on the individual sensitivities of different ecological features.

10.3.11 This was taken into account when defining study areas and these are sufficient to address the potential worst case zone of influence of the Proposed Development on the relevant ecological features concerned.

10.3.12 The extent of the study areas applied during the desk study and field surveys are detailed within Table 10.2 and Table 10.3 below, and in Figures 10C.2 and 10C.3 in Appendix 10C in ES Volume III.

Desk Study

10.3.13 A desk study was carried out to identify nature conservation designations and protected and notable habitats and species potentially relevant to the Proposed Development. The desk study was carried out using the data sources detailed in Table 10.3 and is

reported in detail in the Preliminary Ecological Appraisal (PEA) report in Appendix 10C in ES Volume III.

10.3.14 Protected and notable habitats and species include those listed under Schedules 1, 5 and 8 of the WCA, Schedules 2 and 4 of The Habitats Regulations, and species and habitats of principal importance for nature conservation in England listed under Section 41 (S41) of the NERC Act. Other notable habitats and species have also been considered and assessed on a case by case basis (e.g. those included in national Red Data Books and Lists and within the LBAP, but not protected by legislation). This is consistent with the requirements of relevant planning policy.

Table 10.2: Desk Study Area and Data Sources

ECOLOGY FEATURE	STUDY AREA	SURVEY METHOD	DATE ACCESSED
International statutory nature conservation designations	10 km	Multi-Agency Geographic Information for the Countryside (MAGIC) website	May 2018
National statutory nature conservation designations	2 km	MAGIC website Natural England website	May 2018
Local non-statutory nature conservation designations	2 km	Greater Lincolnshire Nature Partnership	May 2018
Protected and notable habitats and species	1 km	Greater Lincolnshire Nature Partnership Ecological Assessment of Centrica South Humber Bank Power Station (Humber INCA, 2010) Centrica South Humber Bank Biodiversity Action Plan (Humber INCA, 2011) Lincolnshire BAP (LBAP) (Lincolnshire Biodiversity Partnership, 2011)	May 2018
Ponds	250 m	1:25,000 Ordnance Survey maps Aerial photographs (Google Earth) MAGIC website	May 2018
Wintering birds	Site and surrounding	Humber Environmental Data Centre	May 2018

ECOLOGY FEATURE	STUDY AREA	SURVEY METHOD	DATE ACCESSED
	fields (Fields 30, 31, 37 & 39[1])		

Field Surveys

10.3.15 The scope of habitat and protected species survey work considered necessary to inform the EcIA is summarised in Table 10.3. This was determined through a PEA of the Site, as detailed within Appendix 10C: PEA Report in ES Volume III, which also includes the rationale applied when scoping out surveys for certain species or species groups.

10.3.16 The Phase 1 Habitat survey area encompassed all habitats within the Main Development Area (green line boundary) on the Phase 1 Habitat map) and the Wider Survey Area (red line boundary on the Phase 1 Habitat map).

10.3.17 In addition to the surveys undertaken by AECOM, a survey of the Site was previously undertaken by Humber INCA in 2010 and included a Phase 1 Habitat survey, water vole survey and amphibian survey of the two ponds (Humber INCA, 2010).

Table 10.3: Scope and methods of ecological field survey work

ECOLOGY SURVEY	STUDY AREA	SURVEY METHOD	TIMING
Phase 1 Habitat survey	Habitats within the Main Development Area and Wider Survey Area.	Habitats mapped in accordance with JNCC, 2010.	May 2018
Great crested newt	Man-made ponds within the Main Development Area and any ponds within 250 m (where linked habitats are present)	Habitat Suitability Index (HSI) appraisals of ponds in accordance with Oldham *et al.* 2000.	May 2018
		eDNA sampling undertaken in accordance with Defra guidance.	May 2018
Reptiles	Suitable habitat for reptiles within and adjacent to the Main Development Area.	Seven visits in suitable weather conditions using artificial refuges in accordance with standard guidance.	July and Sept 2018
Aquatic invertebrates	Suitable man-made ponds and ditches within the Main Development Area.	Sampling of ditches in accordance with Buglife guidance (Palmer et al., 2013).	June and Sept 2018

[1] Field numbering refers to codes used to identify fields subject to survey as part of the Humber Environmental Data Centre's wintering bird survey programme. The Proposed Development is within Field 39.

		Pond sampling followed the Predictive System for Multimetrics (PSYM) protocols used for ponds (Pond Action, 2002).	
Water vole	Suitable man-made ponds and ditches within the Main Development Area and Wider Survey Area.	Single visit to survey all banks of ditches and ponds.	3rd October 2018
Otter	Suitable man-made ponds and ditches within the Main Development Area and Wider Survey Area.	Single visit to survey all banks of ditches and ponds.	3rd October 2018

Wintering Bird Surveys

10.3.18 Surveys of the Main Development Area for wintering birds were not undertaken because the applicant has committed to providing mitigation for the loss of high tide roosting/ loafing and foraging habitat that is functionally linked to the Humber Estuary SPA/ Ramsar via the South Humber Gateway (SHG) strategic mitigation scheme covered by Policy 9 of the Local Plan. This approach was agreed with Natural England through its Discretionary Advice Service (DAS).

10.3.19 The area of habitat to be drawn down from the SHG strategic mitigation scheme at Cress Marsh, to the south of the Site, has been determined with reference to the wintering bird surveys conducted at the time the SHG scheme was developed in winter 2010/11. The Cress Marsh mitigation scheme has been consented by NELC, and it is understood that this habitat is currently under construction and will be completed in 2018/ early 2019. Further wintering bird surveys of the Site are therefore not necessary to inform this calculation.

Surveys Scoped Out

10.3.20 The following protected species surveys were scoped out primarily on the basis of habitat unsuitability following completion of the PEA (further justification is provided in the PEA in Appendix 10C in ES Volume III:

- Wintering birds – see rationale above.
- Breeding birds – the Main Development Area does not have the potential to support important assemblages of nesting birds. Common species are expected to be nesting within the drains and ponds, and ground nesting species may nest in the open areas of grassland (depending on the grazing regime). Requirements for mitigation for legislative compliance only are considered in this chapter.
- Bats (roosting) - there is no habitat suitable for roosting bats within or adjacent to the Main Development Area. Roosting bats are therefore not considered further in this EcIA.
- Bats (foraging/ commuting) - habitats within the Main Development Area are sub-optimal habitat for foraging/ commuting bats as they are open and exposed due to

their proximity to the banks of the Estuary. Foraging and commuting bats are therefore not considered further in this EcIA.

- Badger – there is no suitable habitat for badger sett construction within the Main Development Area, and no signs to indicate the presence of badger within the Site or Main Development Area were found during the Phase 1 Habitat survey. Badger is therefore not considered further in this EcIA.
- Water shrew (*Neomys fodiens*) – this species was incidentally recorded during the reptile surveys at Pond 2 within the Main Development Area, and may be present on Pond 1 and the surrounding habitats. However, it is widespread and common and is not considered an important feature for the purposes of EcIA. Requirements for mitigation for legislative compliance only are considered in this chapter.

Development Scenarios

10.3.21 As described in Chapter 4: The Proposed Development, there are a number of possible development scenarios – a single stream plant, a two stream plant built in a single phase, or a two stream plant built in two phases.

10.3.22 For the purposes of the ecological impact assessment it is assumed that the majority of the Main Development Area would be cleared, no matter what the final sizing and layout of the buildings and structures. As such a worst case has been assessed in terms of direct construction impacts on ecological features within the Site.

10.3.23 The construction activities considered as part of the assessment would be required for the construction of any of the development scenarios, so the construction phase assessment is relevant to all development scenarios.

10.3.24 For the assessment of impacts during operation, the two-stream plant has been assessed as this has the greatest noise and air emissions, so the assessment presents a 'worst case'.

Consultation

10.3.25 The EIA Scoping Opinion from NELC is included in Appendix 1B of ES Volume III. Comments relevant to the EcIA were provided by Natural England and the Marine Management Organisation and summarised in the NELC Scoping Opinion as follows:

"*The location of the proposal close to the Humber Estuary means that the provisions of the Wildlife and Countryside Act 1981 (as amended) and the Habitats Regulations 2010 will apply. Any assessment will need to consider potential impacts of the development close to the designated sites on all of the features of the SSSI, SPA, Ramsar and SAC. SPA Bird species will need to be considered. Moreover consideration will need to be given to Breeding Birds and Protected Species. It is acknowledged that you have undertaken consultation with Natural England and their response is dated 27th July 2018. You are also advised to consider the comments of the Marine Management Organisation dated 13th July 2018.*"

10.3.26 The assessment presented within this chapter considers impacts on the designated sites, breeding birds and protected species as required.

10.4 Baseline Conditions

10.4.1 The ecological baseline relevant to the Proposed Development is summarised below. Further details of the findings of desk and field based studies, including evaluation of the relative nature conservation value of identified ecological features, are provided in Appendices 10C (Preliminary Ecological Appraisal), 10D (Aquatic Invertebrate Survey), 10E (Water Vole and Otter Survey) and 10F (Reptile Survey) in ES Volume III.

Statutory International Nature Conservation Designations within 10 km

10.4.2 The Humber Estuary is approximately 175 m east of the Site. The Estuary is designated as a European Marine Site (EMS), encompassing designations as a Special Area of Conservation (SAC), SPA and Ramsar site because of its estuarine and intertidal habitats that support internationally important populations of wintering birds (especially geese, ducks and waders) during the migration periods and in winter. In summer, the Humber Estuary supports important breeding populations of bittern (*Botaurus stellaris*), marsh harrier (*Circus aeruginosus*), avocet (*Recurvirostra avosetta*) and little tern (*Sterna albifrons*). The marine species sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*) and grey seal (*Halichoerus grypus*) are also designated features of the SAC.

10.4.3 There are no other international nature conservation designations within a 10 km radius of the Site, which is the worst-case zone of influence defined in Table 10.3. This search radius is sufficient to identify all designations relevant to the assessment of potential air quality impacts.

10.4.4 A signposting report to inform Habitats Regulations Assessment (HRA) of the Proposed Development is presented as Appendix 10G in ES Volume III.

Statutory National and Local Nature Conservation Designations within 2 km

10.4.5 The Humber Estuary is also designated as a Site of Special Scientific Interest (SSSI), the boundary of which largely overlaps with the SPA, SAC and Ramsar designated site boundaries. There are no other statutory national or local nature conservation designations within 2 km of the Site.

Non-Statutory Nature Conservation Designations within 2 km

10.4.6 Four Local Wildlife Sites (LWS) were identified in the desk study area:

- Healing Cress Beds Stallingborough LWS – approximately 0.7 km south-west;
- Sweedale Croft Drain LWS – approximately 0.8 km south-east;
- Laporte Road Brownfield Site LWS – approximately 1 km north-west; and
- Fish Ponds to the West of Power Station, Stallingborough LWS – approximately 1 km south-west.

10.4.7 In addition, two Sites of Nature Conservation Importance (SNCI) were identified; Field West of Power Station Stallingborough SNCI (approximately 30 m south-west) and North Moss Lane Meadow SNCI (approximately 0.9 km north-west). No citations were available for the SNCIs, because they have not been surveyed against the revised Greater Lincolnshire Nature Partnership (GLNP) LWS selection criteria (the LWS designation supersedes the SNCI designation). These sites are therefore not considered further because there is no information available on them.

Habitats

10.4.8 The Main Development Area is bound to the north by South Marsh Road, to the east by the cooling water pumping station, beyond which is the Humber Estuary, to the west by the South Humber Bank Power Station (SHBPS) and to the south by a large arable field. Further information on the habitats present on the Site is provided in Appendix 10C (PEA) in ES Volume III, and a brief summary is provided below.

10.4.9 The Proposed Development is located on an area of land adjacent to the existing SHBPS that has been created and managed for the benefit of nature conservation since the late 2000s. The land was seeded with a wildflower seed mix and two small

ponds were created. There are a number of small plantation woodlands to the west of the SHBPS, and drainage ditches and hedgerows around the margins of the Site, although these are largely outside the Main Development Area.

10.4.10 The wildflower grassland within the Main Development Area is evaluated to be of District nature conservation value. The grassland meets the GLNP LWS site selection criteria for 'neutral grassland' because the area exceeds 0.1 ha and has eight or more scoring grassland species from the GLNP criteria list. The grassland is not considered to merit county value, despite meeting the LWS selection criteria, because it originates relatively recently from a sown seed mixture. As such, the grassland does not represent long-standing grassland habitat.

10.4.11 The two ponds within the Main Development Area do not support a particularly diverse aquatic or marginal flora and do not meet the criteria for LWS site selection for 'freshwater habitat' with reference to the aquatic invertebrate assemblage recorded in Appendix 10D in ES Volume III. The ponds are therefore assessed as being of Local value to nature conservation.

10.4.12 The ditches do not support habitats notable on their own merits and instead have been valued in terms of their importance for the protected species otter and water vole, and their aquatic invertebrate interest (see below).

10.4.13 The Proposed Development will not affect the plantation woodland or hedgerows within the Site, and therefore no evaluation of these Habitats has been undertaken for the EcIA.

Protected and Notable Species

10.4.14 The following protected and notable ecology species were identified either as present in association with the Site, or potentially within the zone of influence of the Proposed Development:

- breeding birds;
- wintering birds (on Site and in adjacent habitats);
- great crested newt (GCN);
- reptiles;
- water vole;
- otter; and
- aquatic invertebrates.

Breeding Birds

10.4.15 The habitats within the Main Development Area provide limited opportunities for nesting birds, although ground nesting birds such as skylark (*Alauda arvensis*) and meadow pipit (*Anthus pratensis*) may be present.

10.4.16 Breeding birds noted during the course of the Phase 1 Habitat survey that may nest in habitats within the Main Development Area included sedge warbler (*Acrocephalus schoenobaenus*), reed warbler (*Acrocephalus scirpaceus*), reed bunting (*Emberiza schoeniclus)*, yellow wagtail (*Motacilla flava*) and linnet (*Carduelis cannabina*). Based on the habitats recorded, the Main Development Area can be expected to support an assemblage of up to Site value.

10.4.17 The Applicant has confirmed the presence of nesting peregrine (*Falco peregrinus*) on the towers of the SHBPS, which is adjacent to the Proposed Development. A pair of peregrine was incidentally recorded during several other surveys undertaken at the Site in 2018 e.g. the reptile survey and water vole survey, and it is assumed that this pair nests on the SHBPS. The UK population of this species has increased substantially in recent times thought likely due to an increase in conservation efforts and control of persecution, as well as the adaptability of the species to exploit previously unused nesting sites e.g. in urban environments (Banks *et al.*, 2003). It is evaluated that this species is of Local nature conservation value.

Wintering Birds (Site)

10.4.18 The Proposed Development occupies a parcel of grassland in close proximity to the Humber Estuary SPA/ Ramsar, in which a number of shallow scrapes have been constructed to attract feeding, loafing and roosting birds at high tide that are displaced from coastal mudflats. This field is referred to as 'Field 39' in the South Humber Bank Wintering Bird Surveys undertaken in 2007/08 and 2010/11 to inform the SHG strategic mitigation approach (Policy 9 in the NE Lincolnshire Local Plan).

10.4.19 Surveys of the Site in winter 2007/ 08 recorded very few SPA/ Ramsar birds. Turnstone were recorded in small numbers (1 or 2 birds) at the far eastern end of the field (i.e. nearest to the coastal mudflats) in November, December, January, February and March across this period. The only other species recorded were redshank (one record of 1 bird in December 20017, and curlew (two records of 7 birds in January 2008, and one record of 1 bird in April 2008). No birds were recorded in the field in the 2010/11 surveys. A summary of the peak counts of birds in the 2007/08 survey season is provided in Table 10.4, with comparison against the Humber Estuary 5-year peak mean counts (from Frost *et al*., 2018) and the thresholds for international importance.

10.4.20 Despite the low numbers of records of SPA/ Ramsar birds within the Main Development Area, and that none were recorded in numbers above the 1% threshold of the Humber Estuary population[2], given its proximity to the Humber Estuary it is considered to be functionally linked to the Humber Estuary SPA/ Ramsar. A precautionary approach has been taken to the assessment, because the survey data are now somewhat out of date and the plot may have become more suitable for wintering birds in the interim period due to sensitive management of the grassland on the Site. The Site is therefore evaluated to be of District nature conservation value to wintering birds.

Table 10.4: Peak Counts and Importance of Site to Wintering Birds (Field 39)

SPECIES	PEAK COUNT ON SITE (2007/08)	HUMBER ESTUARY 5-YEAR MEAN PEAK COUNT	PERCENTAGE OF HUMBER ESTUARY POPULATION ON SITE	THRESHOLD FOR INTERNATIONAL IMPORTANCE
Turnstone	2	249	0.8%	1,400
Redshank	1	3,368	0.03%	2,400
Curlew	7	2,806	0.2%	8,400

[2] The 1% threshold of the Humber Estuary population is used to identify key terrestrial areas within the Estuary that support the SPA/ Ramsar assemblage, and which would be considered to be of County or higher importance.

Wintering Birds (Field to the South)

10.4.21 The large arable field to the south of the Site, for which the southern boundary is defined by Oldfleet Drain, is referred to as 'Field 37' in the South Humber Bank counts.

10.4.22 This field regularly supports lapwing, curlew and golden plover across the winter months, and is noted to be as an important field in the South Humber Bank survey area for high tide roosting, loafing and feeding birds. Although outside the Humber Estuary SPA/ Ramsar designated site boundary, this field is considered to be functionally linked to the SPA/ Ramsar. A summary of the survey results, with the peak counts from the three seasons of survey in 2006/07, 2007/08 and 2010/11 is provided in Table 10.5, with comparison against the Humber Estuary 5-year mean peak counts (from Frost *et al*., 2018) and thresholds for international importance.

10.4.23 Sparrowhawk, buzzard, peregrine and barn owl were all recorded hunting over the field during the survey period. Other records were made during the survey period of snow bunting and snipe.

10.4.24 This field is evaluated as being of Regional importance to nature conservation for it its wintering and passage bird assemblage, for which several key SPA/ Ramsar species have been recorded in numbers well above the 1% threshold of the Humber Estuary population. The eastern part of this field has been allocated for waterbirds as part of the SHG strategic mitigation strategy.

Table 10.5: Peak Counts and Importance of Site to Wintering Birds (Field 37)

SPECIES	PEAK COUNT ON SITE (2006/07 – 2010/11)	HUMBER ESTUARY 5-YEAR MEAN PEAK COUNT	PERCENTAGE OF HUMBER ESTUARY POPULATION ON SITE	THRESHOLD FOR INTERNATIONAL IMPORTANCE
Curlew	75	2,806	**2.7%**	8,400
Golden plover	228	33,994	0.7%	9,300
Lapwing	510	11,702	**4.4%**	20,000
Ringed plover	17	1,089	**1.6%**	730
Black-tailed godwit	15	2,951	0.5%	610
Mallard	46	1,204	**3.8%**	20,000

Wintering Birds (Fields to the north)

10.4.25 Two large arable fields to the north of the Proposed Development (on the north side of South Marsh Road) were also included within the baseline study area; these are Fields 30 and 31 in the South Humber Bank counts.

10.4.26 These fields are also considered to be functionally linked to the Humber Estuary, and although in the most recent survey years they have supported very low numbers of birds, peak counts in 2006/07 for golden plover and lapwing were particularly significant. A summary of the survey results, with the peak counts from the three seasons of survey in 2006/07, 2007/08 and 2010/11 is provided in Table 10.6, with comparison against the Humber Estuary 5-year mean peak counts (from Frost *et al*., 2018) and thresholds for international importance.

10.4.27 This field is evaluated as being of Regional importance to nature conservation for its wintering and passage bird assemblage, for which several SPA/ Ramsar species have been recorded in numbers well above the 1% threshold of the Humber Estuary population.

Table 10.6: Peak Counts and Importance of Site to Wintering Birds (Fields 30 and 31)

SPECIES	PEAK COUNT ON SITE 2006/07 – 2010/11	HUMBER ESTUARY 5-YEAR MEAN PEAK COUNT	PERCENTAGE OF HUMBER ESTUARY POPULATION ON SITE	THRESHOLD FOR INTERNATIONAL IMPORTANCE
Curlew	41	2,806	**1.5%**	8,400
Golden plover	3,600	33,994	**10.6%**	9,300
Lapwing	1,130	11,702	**9.7%**	20,000
Ringed plover	16	1,089	**1.5%**	730
Mallard	6	1,204	0.5%	20,000

Wintering Birds (Coastal Mudflats)

10.4.28 The nearest coastal mudflats to the Site are within the boundary of the Humber Estuary SPA/ Ramsar, and are approximately 175 m from the eastern boundary of the Main Development Area. This is an extensive area of mudflat referred to as the 'Pyewipe mudflats', which extend from the southern end of Immingham Docks south to Grimsby Docks. This mudflat supports large aggregations of birds, particularly black-tailed godwit for which this part of the Estuary is favoured by this species.

Great Crested Newt

10.4.29 Two ponds are present within the Main Development Area. These were created by Centrica as part of a package of biodiversity enhancement measures on the Site including woodland planting and species-rich grassland creation.

10.4.30 Environmental DNA (eDNA) samples were taken from the ponds and both returned negative results for GCN see Appendix 10C in ES Volume III. Two other ponds to the north of the Site (within approximately 250 m) were scoped out of further survey due to the lack of connecting habitat between the ponds and the Site (a large waste recycling centre and a chemical plant lies between the ponds and the Site), which would preclude the movement of GCN (if present in the ponds) onto the Site. A further waterbody to the east was scoped out because it is a cooling water chamber for the SHBPS, and is therefore unsuitable for GCN.

10.4.31 It is concluded that GCN is absent from the Site and this species is not considered further in the EcIA.

Reptiles

10.4.32 The habitats within the Site boundary were appraised in the PEA as being of potential suitability for grass snake (*Natrix helvetica*) and common lizard (*Zootoca vivipara*).

10.4.33 The habitats within the Main Development Area were subsequently surveyed for reptiles, and the survey results are presented in Appendix 10F (Reptile Survey Report) in ES Volume III. No reptiles were recorded during the surveys. However, given the suitability of the ditch habitats for foraging and basking grass snake, it is considered that

there remains a risk that this species may be present on occasion on a transitory basis. Given the lack of reptile records during the surveys, the Site is evaluated as being of negligible value to reptiles. Reptiles are therefore scoped out of the EcIA, except for consideration of requirements for precautionary mitigation to address the low residual risk of grass snake being present on a transitory basis.

Water Vole

10.4.34 Previous surveys of the Site (Humber INCA, 2010) confirmed the presence of water vole in ditches surrounding the perimeter of the Site. The water vole survey undertaken in early October 2018 found limited evidence of water voles, with only a small number of water vole burrows and latrines recorded. There were also *ad-hoc* reports of characteristic water vole 'plops' in the ditches during the undertaking of other surveys on the Site. It has not been possible to calculate a population size class assessment given the limited number of latrines recorded, but based on the survey information collected it is concluded that the population is in the small size class.

10.4.35 A water vole 'plop' was heard in Pond 2, which is in close proximity to the ditch network. It is therefore likely that water voles are foraging in this habitat (and possibly also Pond 1); although it is considered unlikely that above-ground nests would be present in the fringing reeds given the abundance of favoured ditch bank habitat nearby. Camera traps were set at both ponds in an attempt to establish a population size class assessment, and no water voles were recorded. It is therefore concluded that only small numbers of water voles (possibly just single animals) use the ponds on occasion for foraging.

10.4.36 The desk study returned numerous records of water vole in the desk study area, and it appears that the species is widespread and common in the local area, including on Oldfleet Drain to the south of the Site (Atkins, 2018). The Lincolnshire BAP states that the county is considered a national stronghold for water vole. The population of water voles within the Site is therefore evaluated to be of District nature conservation value.

Otter

10.4.37 Fresh otter spraints were recorded on a reptile mat close to the southern ditch in early September 2018. An older spraint was recorded on an outfall pipe on the ditch along the western boundary of the Site. It is therefore likely that otters are foraging throughout the ditch network within the Site, which is well connected to coastal habitats and further ditches running north-south along the landward base of the flood embankment, as well as other good quality otter foraging habitat on Middle Drain (north of the Site) and Oldfleet Drain (south of the Site).

10.4.38 Otter is noted in the Lincolnshire BAP to be present in all river catchments in the county, and was subsequently removed from the list of Species Action Plans in the third edition of the BAP (having been included in the second edition) due to its widespread nature. Otters within the Site boundary are therefore evaluated as being of Local nature conservation value.

Aquatic Invertebrates

10.4.39 None of the aquatic invertebrates recorded within the surveyed waterbodies receive specific legal protection by way of Schedule 5 of the Wildlife and Countryside Act, or are listed on Section 41 of the NERC Act as being of principal importance for nature conservation in England. Survey results are presented in Appendix 10D (Aquatic Invertebrates Survey Report) in ES Volume III.

10.4.40 As discussed above, the assemblage of aquatic invertebrates in Ponds 1 or 2 was not particularly diverse or otherwise notable. Similarly, the ditches were found to support a

moderate diversity of aquatic macroinvertebrates considered fairly typical of a small, slow flowing drain.

10.4.41 Only one notable aquatic invertebrate species was recorded. This was smooth ram's-horn snail (*Gyraulus laevis*) which was recorded from Ditch 2. This snail species is associated with shallow, slow flowing waters, rivers, lakes and ponds, usually found on weeds but sometimes on muddy bottoms and on stones. It is Nationally Scarce, and although not currently threatened in Great Britain, is suffering from adverse habitat loss (Seddon *et al*., 2014).

10.4.42 All of the waterbodies surveyed, with the exception of Ditch 2, are evaluated as being of Local nature conservation value. Ditch 2 is evaluated as being of District nature conservation value as it supported a higher diversity of aquatic macroinvertebrates, including the Nationally Scarce smooth ram's-horn snail.

Summary of Baseline

10.4.43 A summary of the baseline ecology conditions at the Site is provided in Table 10.7 below. As discussed in the methods section, all ecology features valued at local level or above have been taken forward for impact assessment, where there is the potential for these features to be affected either directly or indirectly.

Table 10.7: Summary of Baseline Ecology Features

ECOLOGY FEATURE	NATURE CONSERVATION VALUE	JUSTIFICATION	TAKEN FORWARD FOR ASSESSMENT?
Humber Estuary SPA/ SAC/ Ramsar/ SSSI	International	Site supports qualifying features under the relevant EC Directives that are of international importance.	Yes – potential for direct and indirect effects on habitats and qualifying features
Healing Cress Beds LWS	County	Meets LWS selection criteria.	Yes – potential for air quality impacts
Sweedale Croft Drain LWS	County	Meets LWS selection criteria.	Yes – potential for air quality impacts
Laporte Road Brownfield Site LWS	County	Meets LWS selection criteria.	Yes – potential for air quality impacts
Fish Ponds to the West of Power Station, Stallingborough LWS	County	Meets LWS selection criteria.	Yes – potential for air quality impacts
Semi-improved neutral grassland	District	Grassland meets the area and species-diversity criteria for LWS selection in the greater Lincolnshire area, but has originated relatively recently from a sown mixture.	Yes – this habitat will be entirely lost to the Proposed Development

ECOLOGY FEATURE	NATURE CONSERVATION VALUE	JUSTIFICATION	TAKEN FORWARD FOR ASSESSMENT?
Ponds	Local	Ponds does not support a diverse assemblage of aquatic invertebrates, but are used by water vole.	Yes – both ponds within the Site boundary will be lost to the Proposed Development
Ditches	Ditch 2 – District All other ditches - Local	Ditch 2 supports a diverse assemblage of aquatic invertebrates including one Nationally Scarce species.	Yes – potential for direct and indirect impacts on ditches
Breeding birds (non-Schedule 1)	Site	Small number of breeding pairs likely to be present including ground nesting birds in grassland habitat. Reeds in ditches and ponds also provide suitable nesting habitat for a range of species.	No
Breeding birds (Schedule 1)	Local	Pair of peregrines nesting on SHBPS.	Yes – although outside the Main Development Area, potential for indirect impacts
Wintering birds (Site)	District	Habitats on Site support very low numbers of SPA/ Ramsar birds, but are still considered to be functionally linked to the SPA/ Ramsar due to their proximity to the coastal environment.	Yes – habitats will be lost to the Proposed Development
Wintering birds (off Site)	Regional	Habitats off Site support important aggregations of wintering/ passage birds including those that are the qualifying features of the Humber Estuary SPA/ Ramsar wintering assemblage.	Yes – potential for indirect impacts such as noise/ vibration and visual disturbance during construction and operation
Wintering birds (Pyewipe mudflats)	International	Coastal mudflats adjacent to the Site support important assemblages of waterbirds and are within the boundary of the Humber Estuary SPA/	Yes – potential for indirect impacts such as noise and visual disturbance during construction and

ECOLOGY FEATURE	NATURE CONSERVATION VALUE	JUSTIFICATION	TAKEN FORWARD FOR ASSESSMENT?
		Ramsar	operation.
GCN	Absent	-	No
Reptiles	Absent	-	No
Water vole	District	Present on all perimeter ditches and on both ponds within the Proposed Development boundary. Widespread in the county but populations have declined substantially across the UK.	Yes – potential for direct and indirect impacts on habitats
Otter	Local	Recorded on Site, likely to use all suitable ditches within Proposed Development boundary. Widespread in the county.	Yes – potential for direct impacts

Future Baseline

At Construction

10.4.44 It is reasonable to assume that the current grassland and ditch management regime would continue in the absence of development, and therefore the habitats within the Proposed Development boundary would not be expected to change over this timeframe. Similarly, it is reasonable to assume that the protected species currently present within the Proposed Development and wider Site (breeding birds, wintering birds, water vole and otter) would remain present in these habitats over this timeframe.

10.4.45 The surrounding fields, assuming they remain under arable cultivation, would also be expected to maintain their suitability for high tide feeding, roosting and loafing SPA/ Ramsar birds.

At Opening

10.4.46 Again, assuming the current management of the Site continues in the absence of development, there would be no changes in the habitat or protected species baseline expected over this timeframe.

At Decommissioning

10.4.47 Over a longer timeframe, again in the absence of development and assuming the current management of the Site continues (i.e. annual grass cutting and cutting back of ditch vegetation), it is reasonable to assume there will be no significant changes in the majority of the baseline habitats.

10.4.48 Currently there is no management of the vegetation in the ponds, and in the absence of management to control the reed growth it is possible that they would have dried out within this timeframe. Their value to nature conservation would therefore be expected to have declined, and they may no longer be suitable for water vole or aquatic invertebrates.

10.4.49 The value of the surrounding arable fields to waterbirds may also change over this timeframe. There has been a general decline in many bird species recorded in the Humber Estuary SPA/ Ramsar, and increases in others. The exact reasons for these changes are not known, but may be linked to climate change and breeding success in their summer breeding grounds, many of which are outside the UK.

10.4.50 The coastal sea defences to the east of the Proposed Development fall within Policy Unit L of the Humber Estuary Shoreline Management Plan (SMP) (Scott Wilson, 2010). The policy for this stretch is to 'hold the line' for all epochs covered by the SMP, which extends to 2105. Throughout this period, further action will be taken to sustain the current level of flood risk in the future in response to the potential increase in risk from climate change. The SMP concluded that this may result in limited managed realignment being required due to the potential impacts on the intertidal environment associated with the Humber Estuary SAC/ SPA/ Ramsar as a result of the interruption of coastal processes and the effects of coastal squeeze. This section of coastline may therefore decline in its suitability for waterbirds over the future baseline scenario. This may lead to a corresponding decrease in the numbers of waterbirds using the coastal fields surrounding the Proposed Development.

10.5 Development Design and Impact Avoidance

10.5.1 The design process for the Proposed Development has included consideration of ecological constraints and has incorporated, where possible, measures to reduce the potential for adverse ecological effects, in accordance with the mitigation hierarchy and relevant planning policy. The measures identified and adopted include those that are inherent to the design of the Proposed Development, and those that can realistically be expected to be applied as part of construction environmental best practice, or as a result of legislative requirements.

10.5.2 The development design and impact avoidance measures have been, or would be, adopted during the construction, operation and decommissioning phases of the Proposed Development. These are set out below.

Construction

Measures to Avoid Impacts on the Humber Estuary SPA/ Ramsar

10.5.3 The calculation of the sum of money will be carried out for the application of Policy 9 to the Proposed Development, which will contribute towards the SHG strategic mitigation land being delivered at Cress Marsh (which is part of a wider package of 120 ha of strategic mitigation land to be delivered in the SHG region for the South Humber Industrial Investment Programme (SHIIP)). The delivery of this habitat has been granted planning permission by NELC, and is due to be delivered over winter 2018/ 19. It is therefore assumed that this compensation habitat will be in place by the time of the construction of the Proposed Development. This will ensure that the loss of functionally linked land within the footprint of the Proposed Development will not result in adverse effects on the integrity of the Humber Estuary SPA/ Ramsar, and is therefore compliant with the Habitat Regulations see Appendix 10G[3] in ES Volume III.

3 This impact avoidance habitat has not been taken into account in the Stage 1 HRA screening, because the recent People Over Wind ruling means that impact avoidance/ embedded mitigation cannot be taken into account when determining the potential for likely significant effects. However, the HRA has concluded no adverse effects on integrity at Stage 2 Appropriate Assessment.

10.5.4 For the Proposed Development, the total sum to be commuted to North Lincolnshire Council to buy into the SHG mitigation scheme is calculated as follows: Site Area[4] x £11,580. A Section 106 agreement will be drawn up between the applicant and North Lincolnshire Council to confirm the amount to be paid.

10.5.5 In addition, a close board fence approximately 2.5 m in height will be installed along part of the southern boundary of the Site (see Figure 4.2 in ES Volume II), to provide visual screening during construction and operation to the adjacent field to the south (Field 37). This field has been identified as a key high tide roost for SPA/ Ramsar waterbirds, and the eastern portion of the field is allocated as part of the SHG strategic mitigation package for the SHIIP (referred to in the SHIIP documents as 'Mitigation Site C').

Measures to Avoid Impacts on Water Vole

10.5.6 The layout of the Proposed Development has been designed to accommodate a minimum 5 m undeveloped buffer zone along the banks of all perimeter ditches, to avoid damage and disturbance to the main water vole habitats (i.e. the ditches) associated with the Main Development Area during construction and operation. The buffer zone will be fenced from the Proposed Development to prevent accidental damage during construction.

General Good Practice

Construction

10.5.7 The construction phase of the Proposed Development will comply with industry good practice and environmental protection legislation during construction in relation to prevention of surface and ground water pollution, fugitive dust management and noise prevention or amelioration. In support of this, the construction contractor would prepare and implement a Construction Environmental Management Plan (CEMP) detailing all requirements for environmental protection and legal compliance. A Framework CEMP is presented in Appendix 5A in ES Volume III.

10.5.8 To ensure legislative compliance in relation to nesting birds, all clearance of suitable vegetation during site preparation would be undertaken outside the breeding season (typically March-August inclusive for most species), where possible. In situations where this is not possible, an ecologist would survey the working area for nests before works commence. If nests were discovered, appropriate mitigation would be implemented to ensure that they are not disturbed or destroyed before any works can commence in that area. This would include imposing exclusion zones between the works and nest(s) and suspending vegetation clearance works within the area until any young had fledged.

10.5.9 Precautionary measures would be implemented to prevent trapping wildlife in construction excavations, in order to ensure compliance with animal welfare legislation. Any excavations deeper than 1m would be covered overnight, or where this is not practicable, a means of escape would be fitted (e.g. battered soil slope or scaffold plank), to allow animals (e.g. otter) to vacate excavations should they fall in.

4 This will be calculated based on the footprint of the Main Development Area.

10.5.10 Construction temporary lighting would be arranged so that glare is minimised outside the construction site. Measures to minimise the impact of lighting will be detailed in the CEMP.

Operation

10.5.11 Lighting impacts beyond the Site boundary would be minimised as far as possible, for example by directing lighting away from adjacent habitats, in accordance with the lighting design for the scheme.

10.5.12 Air quality impacts on designated sites will be minimised through the use of appropriate stack heights to aid dispersion of pollutants, and emissions monitoring to demonstrate continued compliance with emission limit values set by the Environment Agency through an Environmental Permit required for the operation of the Proposed Development.

10.5.13 Surface water discharge would be attenuated to green-field run-off rates and therefore there would be no changes in the flow rate within the adjacent drainage ditches. There is therefore no potential for adverse operational effects on the ditch habitats and the protected species they support (water vole).

Decommissioning

10.5.14 Further site surveys would be undertaken in advance of decommissioning works, to determine the status of protected species and to evaluate the habitats present that may be impacted. Relevant avoidance and mitigation measures would be specified and implemented with reference to the findings of the above surveys.

10.5.15 The following measures, would be implemented as appropriate:

- survey findings and associated mitigation requirements would be discussed and agreed with stakeholders as required prior to the start of works;
- relevant stand-off working distances would be identified by the project ecologist and implemented to avoid effects, where practicable, particularly along the banks of ditches where a minimum 5 m buffer zone should be achieved;
- all necessary protected species licences would be obtained to derogate unavoidable impacts on relevant protected species. Mitigation and monitoring would be implemented in accordance with the requirements of the relevant licences;
- works would be planned to avoid key risk periods (seasons) where appropriate and practicable; and
- relevant works would be undertaken under the supervision of an Ecological Clerk of Works to deliver compliance with relevant legislation and approved mitigation.

10.6 Likely Impacts and Effects

Construction

10.6.1 This section describes the impacts and potential effects during the construction phase of the Proposed Development on relevant ecological features in the absence of any mitigation, over and above that which is inherent to the design.

10.6.2 To enable a focussed impact assessment, screening was undertaken of potential impacts of the construction phase that are likely to result in adverse or beneficial effects on relevant ecological features and that require further impact assessment. The relevant impacts are taken forward in the more detailed impact assessment that follows. Those impacts that are considered unlikely to result in effects are scoped out and not considered further.

10.6.3 The following potential source-receptor pathways have been scoped out of the impact assessment:

- dust smothering of habitats within the Humber Estuary SAC/ SSSI – there are no terrestrial SAC/ SSSI habitats within the zone of influence of fugitive dust emissions during the construction phase, which is reasonably expected to be very small. The nearest terrestrial habitat within the designations (coastal saltmarsh) is approximately 500 m from the Proposed Development, and at this distance no dust smothering would be anticipated;
- noise/ visual disturbance to SPA/ Ramsar qualifying breeding bird species (bittern, marsh harrier, avocet and little tern) - there is no suitable habitat for the qualifying species of breeding birds within the potential zone of influence of noise and visual disturbance arising from the construction of the Proposed Development. There is therefore no pathway by which these features could be affected by the Proposed Development;
- noise/ visual disturbance to birds within the SHG mitigation area at Cress Marsh, which is approximately 500 m south-west of the Main Development Area – all construction activities will be on the eastern side of the SHBPS, which provides screening of the construction works to waterbirds using the Cress Marsh mitigation area.
- vibration impacts on the Humber Estuary – this pathway was scoped out of assessment based on distance and baseline conditions (see Chapter 8: Noise and Vibration); and
- air quality impacts on intertidal and subtidal habitats in the SAC/ SSSI – intertidal habitats are not susceptible to the effects of changes in air quality arising from construction (through dust deposition and smothering of habitats) because of their regular tidal inundation. Subtidal habitats have similarly been scoped out.

10.6.4 Impacts during the construction period that have potential to result in significant effects on relevant ecological features, and which were screened into the impact assessment, are considered further below:

- potential effects on Humber Estuary SAC/ SPA/ Ramsar/ SSSI (loss of functionally linked habitat for wintering birds, noise/ vibration and visual disturbance and surface water pollution);
- loss of semi-improved neutral grassland;
- loss of two on-site man-made ponds;
- potential effects on ditches (loss/ damage to habitat and surface water pollution);
- potential effects on Schedule 1 breeding birds (disturbance);
- potential effects on water vole (loss/ damage to habitat, noise and visual disturbance); and
- potential effects on otter (loss/ damage to habitat, noise and visual disturbance).

<u>Potential Effects on Humber Estuary SAC/ SPA/ Ramsar/SSSI During Construction</u>

Loss of High Tide Roosting/ Loafing/ Feeding Habitat that is Functionally Linked to the SPA/ Ramsar

10.6.5 Although the habitat within the Site boundary has been demonstrated to support low numbers of SPA/ Ramsar waterbirds, and there have been no recorded aggregations above 1% of the Humber Estuary threshold, a precautionary approach has been applied

to the Proposed Development because it lies within the Mitigation Zone to which Policy 9 is applicable. This states that *"…proposals which adversely affect the Humber Estuary SPA/ Ramsar site due to the loss of functionally linked land will normally be required to provide their own mitigation in order to comply with the requirements of the Habitats Regulations"*.

10.6.6 To ensure Habitats Regulations compliance for the Proposed Development, it has been assumed that the land within the Proposed Development boundary is 'functionally linked' to the Humber Estuary SPA/ Ramsar. This policy has therefore been applied to the Site and a sum of money will be commuted to the Cress Marsh scheme. Taking into account this embedded mitigation, the Proposed Development is assessed to give rise to a neutral effect on the Humber Estuary SPA/ Ramsar as a result of the loss of functionally linked habitat.

Noise Disturbance to Qualifying SPA/ Ramsar Wintering Bird Assemblage at Pyewipe Mudflats

10.6.7 A noise impact assessment has been completed, and baseline monitoring and noise modelling undertaken to determine whether the Proposed Development would result in any construction phase noise impacts on waterbirds in the nearest part of the Humber Estuary SPA/ Ramsar (see Chapter 8: Noise and Vibration), which is at the Pyewipe mudflats. The dB $L_{Aeq,1h}$ values provide an 'average' of noise levels expected to occur in any one hour as a result of each activity. Such 'continuous equivalent noise levels' form the basis of most noise assessment protocols, but are of limited relevance when considering the effect of noise on waterbirds because waterbirds are perceived to be more susceptible to being disturbed by short, sharp 'peaks' of noise *e.g.* during piling (IECS, 2009). Therefore for piling activities, the L_{Amax} values have been predicted at the nearest sensitive receptors to provide an indication of the likely 'peak' noise events so that they can be compared to the ambient conditions.

10.6.8 Ambient noise levels at noise receptor R3 (on the seawall at the edge of the Humber Estuary SPA/ Ramsar boundary) were recorded at 52 – 58 dB $LA_{eq,T}$ (see Table 8.14 in Chapter 8: Noise and Vibration). The main sources of noise at this location were found to be waves breaking along the shoreline and birdsong. Occasional vehicle usage along the top of the sea wall (motorbikes and quad bikes) resulted in an increase in ambient noise, with a peak noise range of 51.3 – 77.7 dB $LA_{FMax15\ min}$.

10.6.9 Predicted noise levels for the majority of construction activities at R3 were predicted to be within the range 47 – 52 dB $L_{Aeq,1hr}$, which is within the ambient range at the nearest part of Pyewipe mudflats. There will therefore be no discernible change in the noise levels reaching the Humber Estuary SPA/ Ramsar during the majority of the construction phase of the Proposed Development.

10.6.10 The noisiest construction activity that potentially could be used is drop hammer piling, for which the modelling predicts will result in noise levels of 62 dB $L_{Aeq,1hr}$ at R3, which represents an exceedance in the ambient noise level by up to 4 dB. In addition, the type of noise being emitted by drop hammer piling (regular impulsive high noise levels) may be considered as more disturbing to birds. An estimation of the peak noise from piling activity results in predicted levels of 75 dB L_{Amax} at the nearest part of the Estuary. This is significantly higher than the ambient noise level at the measured location on the edge of the Estuary, although as discussed above it is reasonable to assume that there would be some attenuation due to the topography of the seawall, and the fact that the mudflats are below the level of the measured receptor location.

10.6.11 Previous studies such as IECS (1999) and ERM (1996) have demonstrated that birds occupying mudflats elsewhere in the Estuary, such as the Salt End and Pyewipe mudflats, are relatively tolerant of piling noise levels (e.g. marine piling to construct new

jetties). Based on bird behaviour and noise monitoring studies undertaken by Xodus Group during construction piling for the Grimsby River Terminal (Xodus Group 2012), the significance criteria for disturbance to birds are summarised below:

- ≤ 65 dB L_{AmaxF} – negligible;
- > 65 to ≤ 75 dB L_{AmaxF} – minor adverse;
- > 75 to ≤ 85 dB L_{AmaxF} – moderate adverse; and
- > 85 dB L_{AmaxF} – major adverse.

10.6.12 The significance levels in the Xodus study were determined based on the visible responses of waterbirds to noise stimuli and included a variety of behaviours including a 'heads-up' response, physical movement on the ground away from the disturbance source and taking flight.

10.6.13 Predicted noise levels across the nearest mudflats are below 44 dB $L_{Aeq,1hr}$, and are therefore within the ambient range. However, the peak noise clearly results in a much greater increase in baseline noise levels to which waterbirds may be more susceptible. It is therefore reasonable to conclude that noise impacts (taking into account the regular impulsive nature of piling noise, and thus its higher likelihood of disturbance to birds) would be minor, resulting in a minor adverse effect on waterbirds at Pyewipe that is not significant.

Noise/ Vibration Disturbance to Qualifying SPA/ Ramsar Wintering Bird Assemblage in Adjacent Field to the South

10.6.14 The noise impact assessment also considers the potential for noise and vibration impacts during construction on the fields to the south of the Proposed Development (i.e. field 39), which although outside the boundary of the Humber Estuary SPA/ Ramsar is considered to be functionally linked due to the important aggregations of wintering waterbirds present (see Chapter 8: Noise and Vibration).

10.6.15 Baseline noise levels were monitored along the southern edge of the Proposed Development at location LT3. This therefore represents the nearest part of the field 39 to the Proposed Development, and is considered to be the worst case for assessment of effects on this receptor because in reality, the majority of waterbirds will be orientated towards the centre of the field/ towards the eastern edge that borders the Estuary (for predator avoidance reasons).

10.6.16 Noise at this location was generally dominated by noise from the SHBPS, as well as noise from the associated cooling water pumping station and the adjacent chemical plant (Synthomer). Ambient noise levels were in the range 47 – 53 $L_{Aeq,T}$ and 49 – 65 dB L_{AFmax}.

10.6.17 Predicted noise levels arising from construction at this location are in the range 42 – 73 dB $L_{Aeq,1hr}$, at the nearest modelled receptors (on the boundary fence), with the noisiest activity assessed, as expected, being the drop hammer piling. This represents an increase of up to 20 dB on the ambient noise levels, which is a significant increase. However, this would be the worst-case scenario, with the modelled receptors being right on the boundary fence. In reality, most waterbirds would be located towards the central and eastern portions of this field (closer to the Estuary), and would therefore be further away from the noise source. The estimated noise levels at various points across the field have therefore been examined to establish the proportion of the field that would be subject to construction noise levels in excess of ambient levels. Vibration associated with drop hammer piling is also assessed in Chapter 8: Noise and Vibration and the same approach has been applied to the assessment of effects on birds.

10.6.18 In the centre of field 39, noise from the piling activities is predicted to be 62 dB $L_{Aeq,1hr}$, which is still in excess of the ambient noise level. Peak noise resulting from piling is estimated to be 76 dB L_{Amax}, which is within the 'moderate adverse' disturbance threshold based on the Xodus study considered earlier in this assessment. At even the furthest receptors, estimated peak noise levels are in the range 69 – 70 dB L_{Amax}, which would be expected to also result in 'minor adverse' disturbance. For all other construction activities, noise will have attenuated to within the ambient range at this distance from the Proposed Development, and it is reasonable to conclude that the other construction activities would not result in the disturbance or displacement of waterbirds feeding, roosting and loafing in field 39.

10.6.19 In the absence of mitigation, it is therefore assessed that piling noise and vibration associated with construction will likely result in disturbance to birds feeding, roosting and loafing in field 39, if this takes place within the winter months when the highest aggregations of waterbirds are present in the field (September to March inclusive). This may result in displacement of birds within this field i.e. birds choose to move further away from the source of the noise but remain within the field (e.g. moving further south and east), or displacement of birds from this field entirely. This may result in increased energy expenditure as birds are spending more time flying between the mudflats and high tide roosts, and reduced feeding time as they are using more time and energy to find high tide roosting, loafing and feeding sites. This may have adverse effects on body condition and winter survival rates.

10.6.20 It is therefore assessed that in the absence of mitigation, the piling noise and vibration has the potential to cause moderate disturbance to waterbirds in field 39, and this is assessed as giving rise to a moderate adverse effect on the qualifying wintering bird assemblage of the Humber Estuary SPA/ Ramsar, which is significant. Mitigation is discussed in Section 10.7.

Noise/ Vibration Disturbance to Qualifying SPA/ Ramsar Wintering Bird Assemblage in Adjacent Fields to the North

10.6.21 Fields to the north of the Proposed Development on the north side of South Marsh Road (fields 30 and 31) have also been scoped into the noise and vibration impact assessment, because they are considered to be functionally linked to the Humber Estuary SPA/ Ramsar due to the aggregations of wintering birds they support. These fields are expected to experience typically higher ambient noise levels than those to the south, as a result of HGV and other vehicle movements along South Marsh Road and Hobson Way, which runs along the western boundary of field 30.

10.6.22 The central point of these two fields is approximately 400 m north-west for the nearest part of the Proposed Development. For all construction activities except the drop hammer piling, noise levels will have attenuated to within the ambient range at this distance from the works, and would therefore not be reasonably expected to displace waterbirds in fields 30 and 31. Vibration from drop hammer piling also decreases with distance from the piling location.

10.6.23 For drop hammer piling, the predicted noise level at the centre of the fields is 59 dB $L_{Aeq,1hr}$, which is slightly higher than the ambient noise level. Peak noise levels are estimated to be 72 dB L_{Amax} at this location, which is within the threshold for 'minor adverse' disturbance effects based on the Xodus study previously referred to in this chapter. This may result in some localised displacement of waterbirds within the field, should the piling activity overlap with the wintering period when birds are present. However, it is considered that the noise levels are not sufficiently high to result in complete displacement from the fields, particularly given that the southern and western

extents of these fields (particularly field 30) are subject to relatively high ambient noise levels as result of traffic along Hobson Way and South Marsh Road.

10.6.24 It is assessed that, in the absence of mitigation, piling noise and vibration has the potential to cause minor disturbance to waterbirds in fields 30 and 31, and this is assessed as giving rise to a minor adverse effect on the qualifying wintering bird assemblage of the Humber Estuary SPA/ Ramsar, which is not significant.

Visual Disturbance to Qualifying SPA/ Ramsar Wintering Bird Assemblage at Pyewipe Mudflats

10.6.25 Given the distance of the Proposed Development from the Pyewipe mudflats, and the fact that construction will be set against the backdrop of the adjacent SHBPS, it is reasonable to conclude that there is minimal risk of visual disturbance to waterbirds feeding, roosting or loafing within the boundary of the SPA/ Ramsar. Furthermore, the substantial flood embankment wall will provide screening of construction activities to birds present on the mudflats/ shoreline. It is assessed that the Proposed Development will not result in any visual disturbance to waterbirds within the boundary of the Humber Estuary SPA/ Ramsar.

Visual Disturbance to Qualifying Wintering Bird Assemblage in Adjacent Field to the South

10.6.26 The nature and scale of the construction activities associated with the Proposed Development will be set against the backdrop of the SHBPS, and will therefore not represent a significant change in the type of structures already present in habitats adjacent to fields used by waterbirds. Regardless of this, it is difficult to predict with any degree of certainty what the response of waterbirds is/ will be to changes in the visual environment. It is reasonable to assume that such birds are resilient to any changes that do not directly affect habitats within which they are feeding, roosting and loafing, because they are present in a dynamic and highly commercial environment associated with the busy Humber Estuary. This includes the presence of tall structures such as power stations, bulk handling facilities, jetties and cranes, and the movement of large commercial vessels in and out of the nearby ports of Immingham and Grimsby.

10.6.27 As a precaution, a c.2.5 m high close board fence will be installed along part of the southern boundary of the Site (see Figure 4.2 in ES Volume II) to provide visual screening from vehicle and personnel movements during construction to any waterbirds feeding, roosting or loafing in the field.

10.6.28 Visual impacts on waterbirds feeding, roosting and loafing in the field to the south are therefore assessed as giving rise to a neutral effect on the qualifying wintering bird assemblage of the Humber Estuary SPA/ Ramsar.

Surface Water Pollution to Habitats

10.6.29 The ditches within the Site boundary currently capture surface water run-off and divert it to either Oldfleet Drain (to the south of the Site) or Middle Drain (to the north of the Site), from where it is discharged into the Humber Estuary. In the absence of mitigation, there is therefore the potential for contaminated surface water run-off to enter the drainage system and ultimately the Estuary. These pathways are considered in Chapter 14: Water Resources, Flood Risk & Drainage.

10.6.30 However, potential pollution (with sediment or contaminants) arising from surface water run-off from within the Site during construction will be controlled through the adoption of best practice construction methods to meet environmental requirements. This may include temporary measures to attenuate surface water run-off (e.g. SUDS, containment lagoon or similar), the use of drip trays beneath plant and/ or bunding of

fuel or oil tanks and the use of double-skinned fuel or oil tanks to minimise the risk of spillage. These measures will be detailed in the CEMP, and a pollution plan will be prepared to deal with an accidental pollution event.

10.6.31 It is reasonable to conclude that, with these measures in place, there is a negligible risk of surface water pollution to the Estuary during the construction phase. This is assessed as a neutral effect on the Humber Estuary SAC/ SPA/ Ramsar/ SSSI designated habitats, and the ecology features they support (waterbirds, sea lamprey, river lamprey and grey seal).

Loss of Semi-Improved Grassland During Construction

10.6.32 A total of 6.7 ha of semi-improved grassland evaluated to be of District nature conservation value will be permanently lost to the Proposed Development at the start of construction. In the absence of mitigation, this is assessed to be a large impact because it will result in the irreversible loss of this habitat within the Main Development Area. This is assessed to give rise to a moderate adverse effect, which is significant.

Loss of Two Ponds During Construction

10.6.33 The Proposed Development will result in the permanent loss of Ponds 1 and 2. These ponds have been evaluated as being of Local value in terms of their aquatic invertebrate assemblage, but do not merit an evaluation above Site level for their marginal and aquatic habitats. In the absence of mitigation, this pond loss is assessed as a minor adverse effect, which is not significant.

Potential Effects on Ditches During Construction

Loss of Habitat due to Culvert Construction

10.6.34 The Proposed Development will not directly affect Ditch 2, which had the greatest diversity of aquatic invertebrate species and was therefore evaluated to be of the highest nature conservation value of those surveyed within the Site.

10.6.35 The installation of the culvert to facilitate access to the Main Development Area from South Marsh Road will result in direct impacts on approximately 8 – 10 m of Ditch 3, which runs along the northern boundary. This is assessed to be a negligible impact on the ditch, because it will not result in any substantial or extensive damage to the ditch, and as there are already culverted sections of this ditch (further to the west), it will not reasonably change the habitats or assemblage of terrestrial invertebrate species present. This is assessed as giving rise to a negligible effect on the ditch.

Surface Water Pollution

10.6.36 As discussed above in respect of potential impacts on the Humber Estuary, the adoption of best practice construction methods will minimise the risk of surface water pollution to the ditches during the construction phase. There will also be an undeveloped buffer zone established along all ditches of at least 5 m, which will protect the ditches during construction. It is therefore assessed that there will be a negligible effect on the ditches as a result of surface water pollution during construction.

Potential Effects on Schedule 1 Nesting Birds During Construction

Disturbance

10.6.37 A pair of peregrines was observed around the SHBPS during several surveys undertaken in summer 2018, and it is assumed that they nested there; anecdotal evidence from the applicant indicates that they likely nest on SHBPS most years. Given the proximity of the nesting location to the Proposed Development, there is the potential for disturbance to occur during the construction phase. However, given that this

species is present in the existing industrial context of the SHBPS, it is reasonable to assume that the nesting pair would not be adversely affected by the movement of vehicles, plant and people because this will be a regular occurrence on the existing SHBPS site. No disturbance impacts are therefore considered likely, and the effect is assessed as negligible and not significant.

Potential Effects on Water Vole During Construction

Loss of Ditch Habitat due to Culvert Construction

10.6.38 There will be a direct impact on the ditch running along the northern boundary of the Site (Ditch 3), but this will be limited to the installation of a short culvert (approximately 8 – 10 m) to facilitate vehicle access to the Proposed Development from South Marsh Road. The permanent loss of habitat resulting from this part of the Proposed Development will be minimal (the total length of this ditch is around 1 km). No other ditches would be directly affected.

10.6.39 The minor nature of the habitat loss in Ditch 3 would not reasonably result in any loss of water vole territories, or result in fragmentation or isolation of populations because individuals would still be able to access habitats on either side of the culvert. There are existing culverts on this ditch that are clearly not barriers to the movement of water voles throughout the ditch network. This impact is assessed as giving rise to a neutral effect on water voles.

10.6.40 In the absence of mitigation, there is a risk that water voles may be accidentally killed or injured during the construction works, and their burrows damaged or destroyed. Mitigation for this species will therefore be implemented for legislative compliance, and the works will be undertaken under the supervision of an ecologist holding a Natural England Class Licence for water voles.

Loss of Pond Habitat due to Construction

10.6.41 Both ponds within the Proposed Development boundary will be lost during the construction phase. The ponds are not considered to support resident water voles, but form part of the foraging range of the population present in the perimeter ditches. Survey effort was not able to determine a prediction for the likely numbers present given the difficulties in identifying field signs in the dense vegetation surrounding the ponds. However, given the small perimeter of the ponds and the territorial nature of water voles, it is therefore reasonable to conclude that each pond would be likely to support only one or two water voles at any given time.

10.6.42 The loss of this foraging habitat is assessed as a minor adverse impact that would not significantly affect the distribution or abundance of water voles within the ditches surrounding the Site. Effects on water voles are therefore assessed as minor adverse and not significant.

Damage to Ditch Habitat due to Construction

10.6.43 Embedded mitigation in the design of the Proposed Development has incorporated a 5m undeveloped buffer zone along the banks of all perimeter ditches to prevent damage and disturbance to water vole habitats. It is therefore reasonable to assume that water voles burrows would not be damaged by construction activities.

10.6.44 It may be necessary to undertake minor works within the 5 m buffer zone e.g. perimeter fence installation, but any such works would not require deep excavations, and given the 5 m buffer zone, would not reasonably be expected to result in damage to water vole burrows. The ditch banks are particularly steep-sided, and no water vole burrows were identified towards the tops of the banks; burrows are therefore likely to be further down the banks around the water level.

10.6.45 Measures to control the risk of surface water pollution that could result in damage to the riparian habitats supporting water voles e.g. as a result of siltation or a fuel spill, will be set out in the CEMP. A number of other embedded mitigation measures to avoid surface water impacts are set out in Chapter 14: Water Resources, Flood Risk & Drainage. With these measures in place, it is reasonable to conclude that there would be a negligible risk of contamination to the surface water of the ditches during construction.

Accidental Killing or Injury

10.6.46 In the absence of mitigation, there is a risk that water voles may be accidentally killed or injured during the pond draining works, and the works to install the culvert in Ditch 3. Mitigation for this species will therefore be implemented for legislative compliance, and the works will be undertaken under a Natural England licence.

10.6.47 It is considered that the minor extent of the works, and the likely small number of individual water voles affected, mean that displacement of water voles would be undertaken under the supervision of an ecologist holding a Natural England Class Licence for water voles, rather than triggering the requirement for a development-specific licence. This is discussed in Section 10.7 Mitigation.

Noise and Visual Disturbance

10.6.48 There is the potential for noise/ visual disturbance to water vole during the construction phase. However, given the industrial nature of the surrounding land use which includes an operational power station (SHBPS), chemical plant (to the north) and cooling water pumping station(to the east), it is reasonable to assume that water voles resident on ditches in this area would be habituated to current operational activity. Furthermore, the 5 m buffer along all ditches would limit the potential for any disturbance to water voles. It is assessed that construction activities would give rise to neutral effects on water voles.

Potential Impacts on Otter During Construction

Loss of Ditch Habitat due to Culvert Construction

10.6.49 As discussed above in respect of water vole, the minor loss of ditch habitat resulting from culverting of a short section of Ditch 3 for site access will not result in any impacts on otter. The culvert will not obstruct access to or fragment the ditch network, which already contains similar short culverted sections.

Noise and Visual Disturbance

10.6.50 There is the potential for noise/ visual disturbance to otter during the construction phase. This species is largely nocturnal and given that the majority of the works would be undertaken during daylight hours, it is unlikely that any otters would be present during construction activities as there is no suitable habitat cover for them to lie-up in. However, given the industrial nature of the surrounding land use which includes an operational power station (SHBPS), chemical plant (to the north) and cooling water pumping station (to the east), it is reasonable to assume that otters moving through ditches in this area would be habituated to current operational activity. It is assessed that construction activities would give rise to neutral effects on otter.

Operation

10.6.51 This section describes the impacts and potential effects during the operational and maintenance phase of the Proposed Development on relevant ecological features in the absence of any mitigation, over and above that which is inherent to the design.

10.6.52 To enable a focussed impact assessment, screening was undertaken of potential impacts of the operational phase that are likely to result in adverse or beneficial effects on relevant ecological features and that require further impact assessment. The relevant impacts are taken forward in the more detailed impact assessment that follows. Those impacts that are considered unlikely to result in significant effects are scoped out and not considered further.

10.6.53 The following potential source-receptor pathways have been scoped out of the impact assessment:

- noise/ visual disturbance to Humber Estuary SPA/ Ramsar qualifying breeding bird species (bittern, marsh harrier, avocet and little tern) - there is no suitable habitat for the qualifying species of breeding birds within the potential zone of influence of noise and visual disturbance arising from the operation of the Proposed Development. There is therefore no pathway by which these features could be affected by the Proposed Development;
- visual disturbance to qualifying Humber Estuary SPA/ Ramsar wintering bird species feeding on mudflats – the nearest mudflats are approximately 175 m from the Proposed Development, and the cooling water pumping station and substantial flood embankment and seawall lies between the mudflats and the Proposed Development. The type and scale of buildings associated with the Proposed Development are not significantly different from those already present on the SHBPS site, and therefore there would be no discernible visual change in the baseline environment; and
- air quality impacts on intertidal and subtidal habitats in the Humber Estuary SAC/ SSSI – intertidal habitats are not susceptible to the effects of changes in air quality arising from stack emissions during operation (increased nitrogen and acid deposition) because of their regular tidal inundation. Subtidal habitats have similarly been scoped out.

10.6.54 Impacts during the operational period that have potential to result in significant effects on relevant ecological features, and which were screened into the impact assessment are considered further below:

- potential effects on Humber Estuary SAC/ SPA/ Ramsar/ SSSI (changes in air quality, noise and visual disturbance and surface water pollution);
- potential effects on Local Wildlife Sites (changes in air quality);
- potential effects on ditches (surface water pollution);
- potential effects on Schedule 1 breeding birds (disturbance);
- potential effects on water vole (noise and visual disturbance, surface water pollution to ditches); and
- potential effects on otter (noise and visual disturbance, surface water pollution to ditches).

<u>Potential Effects on Humber Estuary SAC/ SPA/ Ramsar/ SSSI During Operation</u>

Air Quality Impacts on Habitats

10.6.55 An air quality impact assessment has been undertaken and is presented in ES Chapter 7: Air Quality. The proposed stack heights assessed have been based on the standard offerings under consideration, and are considered to be the lowest stack heights that would be applied to the plant (100 m), and therefore would result in the worst case impacts.

10.6.56 There are two measures of particular relevance when considering the potential for significant effects on habitats to result from changes in air quality arising from the Proposed Development. The first is the concentration of oxides of nitrogen (known as NO_x) in the atmosphere. The main importance is as a source of nitrogen (N), which is then deposited on adjacent habitats either directly (known as dry deposition, including directly onto the plants themselves) or washed out in rainfall (known as wet deposition). The deposited nitrogen can then have a range of effects, primarily growth stimulation or inhibition, but also biochemical and physiological effects such as changes to chlorophyll content. NO_x may also have some effects which are un-related to its role in total nitrogen intake (such as the acidity of the gas potentially affecting lipid biosynthesis) but the evidence for these effects is limited and they do not appear to occur until high annual concentrations of NO_x are reached.

10.6.57 The guideline atmospheric concentration of NO_x advocated by Government for the protection of vegetation is 30 micrograms per cubic metre (μgm^{-3}), known as the Critical Level (Hall *et al*. 2006)). This is driven by the role of NO_x in N deposition and in particular in growth stimulation and inhibition. If the total NO_x concentration in a given area is below the critical level, it is unlikely that N deposition will be an issue, unless there are other sources of nitrogen (e.g. ammonia). If it is above the critical level then local N deposition from NO_x could be an issue and should be investigated.

10.6.58 The second important metric is a direct determination of the rate of the resulting N deposition, which is habitat specific because different habitats have varying tolerance to nitrogen. For many habitats there are measurable effects in the form of published dose-response relationships for N deposition, which do not exist for NO_x. Unlike NO_x, the N deposition rate below which current evidence suggests that effects should not arise is different for each habitat. The rate (known as the Critical Load) is provided on the UK Air Pollution Information System website (www.apis.ac.uk) and is expressed as a quantity (kilograms) of nitrogen over a given area (hectare) per year (kg N/ha/yr). More recently, there has also been research compiled that investigates N dose-response relationships in a range of habitats (Caporn *et al*. 2016).

10.6.59 For completeness, rates of acid deposition were also calculated. Acid deposition derives from both sulphur and nitrogen. It is expressed in terms of kiloequivalents (keq) per hectare per year. The thresholds against which acid deposition is assessed are referred to as the Critical Load Function.

10.6.60 The effects of elevated Hydrogen Fluoride (HF) emissions have been discounted from the assessment for ecological receptors on the basis that habitats are not sensitive to this type of pollutant.

Nitrogen Oxides (NO_x)

10.6.61 The air quality impact assessment has modelled a number of receptors within the Humber Estuary SAC/ SPA/ Ramsar/ SSSI that are sensitive to NOx emissions. The nearest to the Proposed Development is an area of saltmarsh habitat approximately 400 m south-east (receptors E1_1, E1_2 and E1_3 in Chapter 7: Air Quality). At these receptors, the process contribution resulting from the maximum annual mean NOx emissions is 2.4%, 2.4% and 2.5% respectively of the critical level for the Humber Estuary SAC/ SPA/ Ramsar. This therefore exceeds the threshold at which an adverse effect on the designated habitats (and therefore the species they support) may occur, and indicates that further assessment is required.

10.6.62 At this location, APIS data indicate that the background NOx deposition at these receptors is 29.2 $\mu g/m^3$. The process contribution from the Proposed Development, although greater than 1%, results in total NOx of 29.9 $\mu g/m^3$, which does not exceed the critical level for all vegetation types from the effects of NOx of 30 $\mu g/m^3$.

10.6.63 None of the other modelled receptors within the designated site were found to experience NOx greater than 1% of the critical level. It is therefore assessed that even with the elevation of NOx above the 1% screening threshold, when this is considered in greater detail there remains no exceedance of the critical level for this habitat type. NOx emissions from the Proposed Development are therefore assessed as resulting in a neutral effect on the Humber Estuary SPA/ SAC/ Ramsar/ SSSI (not significant).

Nutrient Nitrogen (N) Deposition

10.6.64 The air quality impact assessment has concluded that the annual N deposition rate (kg N/Ha/year) process contribution at the nearest saltmarsh habitat would be 2.1% of the critical load at receptors E1_1, E1_2 and E1_3. As this is above the 1% screening threshold, it is therefore necessary to examine the output from the modelling in greater detail to establish whether this elevation in N deposition would result in any significant effects on the saltmarsh habitat.

10.6.65 The total annual N deposition predicted at these three receptors is 0.4 kg N/ha/yr, resulting from NOx and ammonia (NH_3), compared to the background deposition of 15.7 kg N/ha/yr. With the Proposed Development there would therefore be no exceedance of the critical load for this habitat type, which is 20 – 30 kg N/ha/yr. It is therefore assessed that N deposition resulting from the Proposed Development will result in a neutral effect on the Humber Estuary SPA/ SAC/ Ramsar/ SSSI that is not significant.

Acid Deposition

10.6.66 For acid deposition (keq/Ha/year), the air quality impact assessment identified that there would be no exceedances of the 1% critical level screening threshold for potential adverse effects on sensitive habitat types within the Humber Estuary SAC/ SPA/ Ramsar/ SSSI. It is therefore concluded that there would be no significant effects on the Humber Estuary designated site as a result of acid deposition.

Sulphur Dioxide (SO_2)

10.6.67 For sulphur dioxide, the air quality impact assessment identified that there would be no exceedances of the 1% critical level screening threshold for potential adverse effects on sensitive habitat types within the Humber Estuary SAC/ SPA/ Ramsar/ SSSI. It is therefore concluded that there would be no significant effects on the Humber Estuary designated site as a result of SO_2 emissions from the Proposed Development.

Air Quality Impacts on Habitats (Cumulative)

10.6.68 A cumulative air quality impact assessment has been undertaken and a summary is presented in Chapter 17: Cumulative and Combined Effects.

Surface Water Pollution to Habitats Supporting Marine Species

10.6.69 Potential pollution (sediment or contaminants) arising from surface water run-off from within the Site during operation will be controlled through the drainage design. This is set out in Chapter 13: Surface Water, Flood Risk and Drainage (ES Volume I).

10.6.70 There is therefore no surface water pathway by which the Proposed Development could impact on the Humber Estuary SAC/ SPA/ Ramsar/ SSSI designated habitats, and the marine ecology features they support (sea lamprey, river lamprey and grey seal).

Noise Disturbance to Qualifying SPA/ Ramsar Wintering Bird Assemblage at Pyewipe Mudflats

10.6.71 Predicted operational noise levels at receptor R3 (at the edge of the Humber Estuary SPA/ Ramsar boundary) are 5 dB below the ambient noise level of 52 dB L_{Aeq} during

the worst-case hour at night (0600 – 0700). This results in an increase in the ambient level at receptor R3 of no more than 1 dB, which is not significant.

10.6.72 With regards to L_{AFmax} levels during operation of the Proposed Development, it is not expected that significant L_{AFmax} events will occur at the Site which will be audible at along the Humber Estuary. The activities that are likely to result in the highest L_{AFmax} levels are the tipping of waste into the bunker when it is delivered and the placing of waste into the shredder. As these activities are undertaken within the enclosed fuel reception hall and fuel bunker parts of the building, which are located at the furthest point of the building from the Estuary, L_{AFmax} levels from these activities are unlikely to be audible at the Estuary.

10.6.73 It is assessed that operational noise arising from the Proposed Development will result in a neutral effect on waterbirds feeding, roosting and loafing in the Pyewipe mudflats.

Noise Disturbance to Qualifying SPA/ Ramsar Wintering Bird Assemblage in Adjacent Fields to North

10.6.74 At the nearest part of the northern fields to the Proposed Development operational noise is predicted to be up to 63 dB L_{Aeq}, which is above the ambient level for the 'worst case hour' between 06:00 and 07:00 (see Chapter 8: Noise and Vibration and the noise contours are shown on Figure 8.2 in ES Volume II). However, as discussed above in respect of the assessment for construction noise, it is reasonable to assume that waterbirds using these fields would not be using habitats close to boundary features (due to the requirement for scanning distances for predator avoidance), and are therefore more likely to be orientated towards the middle of the fields. In the centre of fields 30 and 31, operational noise levels will have attenuated with distance to around 50 dB L_{Aeq}, which is similar to ambient levels. No displacement of waterbirds would therefore be anticipated.

10.6.75 Noise associated with the operation of the Proposed Development is therefore assessed as giving rise to a neutral effect on the qualifying wintering bird assemblage of the Humber Estuary SPA/ Ramsar using the functionally linked fields to north (fields 30 and 31).

Noise Disturbance to Qualifying SPA/ Ramsar Wintering Bird Assemblage in Adjacent Field to South

10.6.76 At the nearest part of the southern field to the Proposed Development, operational noise is predicted to be up to 62 dB L_{Aeq}, which is above the ambient level. However, as discussed above in respect of the assessment for construction noise, it is reasonable to assume that waterbirds using the fields would not be using habitats close to boundary features (due to the requirement for scanning distances for predator avoidance), and are therefore more likely to be orientated towards the middle of the field. Towards the centre of fields 39, operational noise levels will have attenuated to around 50 dB L_{Aeq}, which is similar to ambient levels. No displacement of waterbirds would therefore be anticipated.

10.6.77 Noise associated with the operation of the Proposed Development is therefore assessed as giving rise to a neutral effect on the qualifying wintering bird assemblage of the Humber Estuary SPA/ Ramsar using the functionally linked field to the south (field 39).

Visual Disturbance to Qualifying Wintering Bird Assemblage in Adjacent Field to the South

10.6.78 The nature and scale of the operational activities associated with the Proposed Development will be set against the backdrop of the SHBPS, and will therefore not

represent a significant change in the type of structures already present in habitats adjacent to fields used by waterbirds. Regardless of this, it is difficult to predict with any degree of certainty what the response of waterbirds is/ will be to changes in the visual environment. It is reasonable to assume that such birds are resilient to any changes that do not directly affect habitats within which they are feeding, roosting and loafing, because they are present in a dynamic and highly commercial environment associated with the busy Humber Estuary. This includes the presence of tall structures such as power stations, bulk handling facilities, jetties and cranes, and the movement of large commercial vessels in and out of the nearby ports of Immingham and Grimsby.

10.6.79 It is therefore reasonable to assume that any SPA/ Ramsar waterbirds roosting/ loafing/ foraging in field to the south of the Site are habituated to the industrial nature of the surrounding area such that they would not be disturbed by the presence of tall chimney structures and other buildings on adjacent land. As a general precaution the c.2.5 m high close-boarded fence will be retained for the operational lifespan of the Proposed Development to reduce potential visual disturbance on wintering birds from ground level activities (operational traffic and staff). Visual impacts on waterbirds feeding, roosting and loafing in the adjacent field to the south are therefore assessed as giving rise to a neutral effect on the qualifying wintering bird assemblage of the Humber Estuary SPA/ Ramsar.

Potential Impacts on Local Wildlife Sites During Operation

Air Quality Impacts

10.6.80 The air quality impact assessment in Chapter 7 has considered potential air quality impacts arising from emissions of pollutants from the Proposed Development on the non-statutory sites identified within 2 km of the Site, although there are no baseline data for these sites as there are for the statutory designated sites because they are not included on the APIS database. Various assumptions on the habitat types have therefore been made to inform the modelling process.

10.6.81 Of the local sites considered in the modelling, Stallingborough Fish Ponds LWS (E7), Healing Cress Beds LWS (E8) and Sweedale Croft Drain (E9) will be subject to cumulative PCs of NOx from all plans/ projects above the 1% screening threshold. When the PECs for NOx at these three LWSs are examined in greater detail, at all three sites this results in an exceedance of the critical level. The cumulative N deposition PC will be 0.2 – 0.5 kg N/ha/yr and the total PEC will be 15.9 to 25 kg N/ha/yr. The contribution from the Proposed Development alone is 0.1 to 0.3 kg N/ha/yr, which is a relatively small increase in N deposition (i.e. less than 5% of the critical load). When considering high background deposition rates, this is assessed as a minor adverse effect on the LWSs that is not significant.

Potential Effects on Ditches During Operation

Surface Water Pollution

10.6.82 Embedded mitigation in the drainage design to control surface water run-off during operation will ensure that there is negligible potential for any pollution to habitats that may be used by water vole. Similarly, discharge will be attenuated on site to greenfield run-off rates, and therefore there is no potential for any impacts on the water levels within the ditch. No impacts on ditch habitats or the aquatic invertebrates they support are predicted as a result of the operation of the Proposed Development.

Potential Effects on Schedule 1 Nesting Birds During Operation

Disturbance

10.6.83 As discussed above in respect of construction disturbance, it is reasonable to assume that the nesting peregrines would not be disturbed by the presence of a power station of a similar scale and nature to that which already exists on the Site, or by the movement of vehicles, plant and personnel as is currently the case on the SHBPS. No disturbance impacts are therefore considered likely, and the effect is assessed as negligible and not significant.

Potential Impacts on Water Vole During Operation

Noise and Visual Disturbance

10.6.84 There is the potential for noise/ visual disturbance to water vole during the operational phase. However, given the industrial nature of the surrounding land use which includes an operational power station (SHBPS), chemical plant (to the north) and cooling water pumping station (to the east), it is reasonable to assume that water voles resident on ditches in this area would be habituated to current operational activity. The 5 m undeveloped buffer zone will also minimise the risk of disturbance to water voles. It is assessed that operational activities would give rise to neutral effects on water voles.

Surface Water Pollution to Ditches

10.6.85 Embedded mitigation in the drainage design to control surface water run-off during operation will ensure that there is negligible potential for any pollution to habitats that may be used by water vole. Similarly, discharge will be attenuated on site to greenfield run-off rates, and therefore there is no potential for any impacts on the water levels within the ditch.

Potential Impacts on Otter During Operation

Noise and Visual Disturbance

10.6.86 There is the potential for noise/ visual disturbance to otter during the operational phase. As discussed above in respect of water vole, given the industrial nature of the surrounding land use which includes an operational power station (SHBPS), chemical plant (to the north) and cooling water pumping station (to the east), it is reasonable to assume that otters moving through ditches in this area would be habituated to current operational activity. It is assessed that operational activities would give rise to neutral effects on otter.

Surface Water Pollution to Ditches

10.6.87 Embedded mitigation in the drainage design to control surface water run-off during operation will ensure that there is negligible potential for any pollution to habitats that may be used by foraging/ passage otter. Similarly, discharge will be attenuated on site to greenfield run-off rates, and therefore there is no potential for any impacts on the water levels within the ditch.

Decommissioning

10.6.88 In a number of cases impacts associated with the decommissioning phase of the Proposed Development are likely to be of a similar nature to those associated with the construction phase and as a result the potential effects on ecological features are not anticipated to differ significantly from those predicted at construction.

10.6.89 The extent of habitat loss that is likely to be required during decommissioning is likely to be much less than at construction, and the resulting effects on ecological features are therefore likely to be reduced. As described in Section 10.9, appropriate pre-works

surveys and mitigation or impact avoidance measures will be implemented for the decommissioning phase as necessary.

10.7 Mitigation and Enhancement Measures

Humber Estuary SPA/ Ramsar Mitigation

Piling Noise and Vibration Mitigation

10.7.1 The assessment has concluded that there is the potential for significant adverse effects on waterbirds in the adjacent field to the south (field 39), which is functionally linked to the Humber Estuary SPA/ Ramsar, as a result of piling noise and vibration during construction. Although the piling activity will only be undertaken for a relatively short period of time (estimated at 2 to 4 months), it is not possible at this stage to determine whether this will overlap with the sensitive wintering bird period. It may therefore occur when birds are present and could be disturbed or displaced.

10.7.2 At this stage, the mitigation measures to be employed have not been fixed; this is to enable sufficient flexibility for the contractor to determine the best available technique for noise abatement during piling works. For the purposes of this EcIA, it is assumed that mitigation will be one of the following options:

- seasonal piling restrictions – piling will be restricted for two hours either side of high tide in the period September to March inclusive, to avoid the most sensitive winter months, and the time period when birds are most likely to be present in the fields (i.e. when they are pushed off the coastal mudflats at high tide); or
- Continuous Flight Auger (CFA) piling – this technique is virtually vibration free, and one of the quietest forms of piling because it does not require the loud 'bangs' associated with drop hammer piling techniques. If this technique is adopted, it will be possible to reduce construction noise reaching the fields by 12 dB to within ambient levels, and vibration disturbance effects would also be reduced.

Visual Screening

10.7.3 A c.2.5 m tall closeboard fence will be installed along part of the southern boundary of the Site (see Figure 4.2 in ES Volume II) as part of the Site preparation works and construction compound set up. This will act as a visual screen for vehicle and personnel movements within the Main Development Area to reduce the risk of visual disturbance to birds feeding, roosting and loafing in field 39 during construction and operation.

Ecological Management and Enhancement Plan (EMEP)

10.7.4 An EMEP will be prepared and agreed with the local planning authority prior to the commencement of works, or otherwise as conditioned. An area of land approximately 1 ha in extent has been set aside within the Site for ecological mitigation and biodiversity enhancements to the west of the SHBPS as an 'ecological mitigation and enhancement area' (see Figure 4.2).

10.7.5 The EMEP will include details on:

- water vole mitigation;
- grass snake mitigation;
- breeding bird mitigation;
- new pond creation (including detailed pond design, location and planting specification);

- grassland mitigation (location and detailed planting specification);
- fish mitigation;
- the location and construction specifications for log pile refuges and bird nest boxes;
- appropriate management of the habitats including the newly created grassland and new pond;
- habitat monitoring (including targets and thresholds for remedial action); and
- timetables and responsibilities for undertaking the above tasks.

Water Vole Mitigation

Culvert Installation on Ditch 3

10.7.6 Works to install the culvert on Ditch 3 will be undertaken under the supervision of an ecologist holding a Class Licence for water vole. This is due to the minor extent of the works (approximately 8 – 10m) that does not trigger the requirement for a development licence from Natural England. A separate water vole mitigation strategy document will be prepared as part of the Class Licence process; however, the approach and timings are outlined below. It is assumed that an appropriately worded planning condition will be attached to the planning consent.

10.7.7 The approach to mitigation (based on the current indicative construction programme) will be as follows:

- ditch vegetation (within the channel and on the banks) will be strimmed back to ground level under the supervision of the Class Licensed ecologist to displace water voles from the affected section of habitat in the period 15th February to 15th April 2019;
- ditch vegetation will be kept strimmed short until works commenced;
- arisings will be removed;
- prior to the commencement of works, the Class Licensed ecologist will inspect the working area to confirm that water voles were absent from any burrows present;
- on confirmation of the absence of water voles, works to install the culvert will commence under the supervision of the Class Licensed ecologist; and
- any amphibians encountered during the works will be moved to a place of safety away from the working area.

10.7.8 This mitigation approach will also be sufficient to address the risk of accidental killing/ injury to water shrew (*Neomys fodiens*), which has been recorded on Pond 2 and may be present in the perimeter ditches see Appendix 10E: Otter and Water Vole Survey Report in ES Volume III. This species is protected under the Wildlife and Countryside Act 1981.

10.7.9 Any amphibians (e.g. common toad) encountered during the works will be moved to a place of safety by the supervising ecologist; likely to be in close proximity to a nearby ditch.

Pond Removal

10.7.10 Works to remove the ponds will also be undertaken under the supervision of an ecologist holding a Class Licence for water vole, as for Ditch 3. The mitigation strategy (based on the current indicative construction programme) is outlined below.

- Pond marginal vegetation would be strimmed back to ground level under the supervision of the Class Licensed ecologist to displace water voles from the ponds in the period 15th February to 15th April 2019.
- A vole-proof fence will be installed around each pond to maintain the exclusion area until construction commences in around Autumn 2019. The fence will be constructed from sheets of thick marine plywood (or similar) at least 25 mm thick, installed to a minimum above-ground height of 1.2 m and buried to a minimum depth of 0.5 m (posts to be located on the inside of the fenced area). The fence will be set back from the pond edge by at least 2 m.
- The fencing will be installed under the supervision of the Class Licensed ecologist, and will be maintained as a vole-proof barrier until the draining and infilling works are to be undertaken.
- The removal of the vole-proof fence will be undertaken under the supervision of the Class Licensed ecologist.
- The draining and infilling of the ponds will be undertaken under the supervision of the Class Licensed ecologist.

10.7.11 This mitigation approach will also be sufficient to address the risk of accidental killing/ injury to water shrew, which has been recorded on Pond 2, and may also be present on Pond 1 see Appendix 10E: Otter and Water Vole Survey Report in ES Volume III. This species is protected under the Wildlife and Countryside Act 1981.

10.7.12 Any amphibians (e.g. common toad) encountered during the draining and infilling will be moved to a place of safety by the supervising ecologist; likely to be in close proximity to a nearby ditch.

Grass Snake Mitigation

10.7.13 Due to the potential for grass snake to occur on the banks of ditches, a precautionary approach to the clearance of vegetation will be undertaken (alongside the mitigation for water vole). The strimming of vegetation from the banks of Ditch 3 for water vole displacement will also be sufficient to displace grass snake.

Breeding Bird Mitigation

10.7.14 The removal of the marginal vegetation from the ponds and the affected sections of ditch will be timed to ensure that there is no risk of breeding birds nesting in the vegetation prior to works commencing. If the vegetation removal does not commence until after the end of March 2019, then a pre-works check for nests will be undertaken. However, given that the nesting species incidentally recorded in the reed vegetation are largely migratory passerines (e.g. reed bunting, sedge warbler), it is considered unlikely that any would have established nests by early April.

10.7.15 Grassland vegetation will be removed by the end of March 2019 at the latest (based on the current indicative construction programme) to avoid ground nesting bird constraints. If vegetation removal (including topsoil stripping) cannot be undertaken prior to the onset of the nesting season (i.e. by 1st April 2019), then bird deterrent measures will be implemented to deter birds from nesting e.g. bird scaring tape, or vegetation removal will be delayed until after the breeding bird season.

Pond Mitigation

10.7.16 A new wildlife pond will be created to mitigate for the loss of the two small ponds within the Proposed Development area. The new pond will be created in habitat west of the

existing SHBPS, where it will remain in close proximity to the perimeter ditches so that it is similarly accessible by foraging water voles resident on the ditches.

10.7.17 The pond will be designed with a non-uniform margin and varying depths to maximise the habitat niches available for aquatic plants, invertebrates, reptiles and amphibians.

10.7.18 The margins of the pond will be planted with a small amount of native aquatic and marginal plant species to assist with the establishment of vegetation, but will be primarily allowed to establish naturally.

10.7.19 If the timescales permit, and if practicable, the new pond will be 'seeded' with water from the ponds being drained and infilled, to transfer aquatic invertebrates and plant fragments to assist with the establishment of the pond. This would not be undertaken if any invasive non-native plant species are subsequently found to have colonised these ponds.

10.7.20 An appropriate management plan for the mitigation pond will be developed and implemented post-completion of the pond. This will be incorporated within the EMEP (see above). The initial post-completion and establishment period will be for five years, and the pond will be monitored annually in September to determine whether any management intervention (e.g. targeted reed clearance to maintain open water, removal of leaf litter etc.).

Grassland Mitigation

10.7.21 An area of species-rich grassland will be created in the ecological mitigation and enhancement area, which will be established to the west of the SHBPS. This will offset some of the losses of semi-improved grassland within the footprint of the Main Development Area. Creation and management of the habitat will be set out in the EMEP (see above).

10.7.22 The initial post-completion and establishment period will be for five years, and the grassland will be monitored once every other year (commencing one year after planting) to determine whether any management intervention is required (e.g. targeted weed removal, greater frequency of mowing etc.).

Fish Mitigation

10.7.23 A Fish Management Plan will be prepared prior to the drainage of the ponds and agreed with relevant stakeholders. This will set out measures to comply with the relevant legislation regarding fish welfare that will be implemented prior to and during the draining and infilling of the ponds during the construction phase. Health checks will be completed on the fish (fish health checks are necessary where they are to be introduced into rivers, canals and lakes connected to open waters; the requirement for this will be determined in advance of fish mitigation works commencing), and an appropriate receptor site will be sourced, subject to satisfactory health of the fish. An Environment Agency permit will be obtained prior to any movement of live fish to a receptor site.

Biodiversity Enhancement

10.7.24 Biodiversity enhancement measures will be set out in the EMEP, and will be in addition to the mitigation measures set out above. The following habitat enhancements will be delivered:

- creation of log pile refuges in the ecological mitigation and enhancement area to create ecological niches for reptiles, amphibians and terrestrial invertebrates; and
- installation of bird nest boxes on mature trees to the west of the SHBPS.

10.8 Limitations or Difficulties

10.8.1 Any limitations to the collection of field survey data are identified in the relevant technical appendices.

10.8.2 No significant limitations to the completion of the ecological impact assessment were identified.

10.9 Residual Effects and Conclusions

Construction

10.9.1 Where effects on ecology features scoped into the EcIA were assessed as significant before mitigation, and/ or mitigation has subsequently been proposed in Section 10.7 above to reduce the magnitude of impacts, the residual effects have been assessed below.

Residual Effects on Humber Estuary SAC/ SPA/ Ramsar/ SSSI

Air Quality

10.9.2 The assessment has concluded that the Proposed Development will give rise to no residual significant adverse air quality effects on sensitive habitats within the Humber Estuary SPA/ SAC/ Ramsar/ SSSI.

Noise/ Vibration Disturbance

10.9.3 No residual significant adverse effects on waterbirds feeding, roosting and loafing on Pyewipe mudflats within the Humber Estuary SPA/ Ramsar are predicted given the distance of the development works from the mudflats, and the noise screening provided by the substantial flood defence embankment.

10.9.4 With mitigation, piling noise and vibration during construction will be reduced to within ambient levels (e.g. through seasonal restrictions or the use of CFA piling) in the field to the south of the Proposed Development that is considered to be also functionally linked to the Humber Estuary SPA/ Ramsar. Residual effects on waterbirds in this field, and thus the Humber Estuary, are therefore assessed as minor adverse and not significant.

Visual Disturbance

10.9.5 The installation of a c.2.5 m tall barrier fence between the Proposed Development and the field to the south will mitigate for potential visual disturbance as a result of personnel, vehicle and plant movements within the Main Development Area. The residual impact of disturbance is therefore assessed as neutral and not significant.

Surface Water Pollution

10.9.6 Embedded mitigation during construction for legislative requirements will minimise the risk of pollution to the surrounding ditch network, and residual effects on the Humber Estuary are therefore assessed as neutral and not significant.

Residual Effects on Semi-Improved Grassland

10.9.7 Approximately 1 ha of species-rich grassland will be created and managed in the ecological mitigation and enhancement area to the west of the SHBPS, to mitigate for losses of this habitat within the Main Development Area. The area will be planted with a species-rich wildflower/ grassland seed mix and will aim to improve the biodiversity of the grassland habitat within the Site, and be of higher ecological value than the area of semi-improved grassland habitat lost to the Proposed Development.

10.9.8 Although mitigation for the loss of grassland habitat will be delivered, there is insufficient space within the Site boundary for like-for-like replacement. There will therefore be a

net loss of this habitat within Site, although the creation and management of a more species-rich grassland than that lost will partially offset any impacts on the overall biodiversity of the Site. The residual effect on grassland habitats is therefore assessed as minor adverse and not significant.

Residual Effects on Ponds

10.9.9 A new pond will be created within the ecological mitigation and enhancement area (to the west of the SHBPS) to mitigate for the loss of ponds to the Proposed Development. With the implementation of a long-term management and enhancement plan for this new pond, a pond of higher biodiversity value than the two lost will be delivered. In addition, although the proposed attenuation lagoon within the Main Development Area will have primarily a drainage function, it will also deliver standing water habitat that may be exploited by a range of species including water vole, water shrew, grass snake and aquatic invertebrates.

10.9.10 The creation of a replacement pond of high nature conservation value will result in there being an overall neutral effect once the pond has become established. However, in the short to medium-term, the residual effect remains as minor adverse, recognising that the development of the pond habitat to a nature conservation value equal to or greater than the ponds currently present within the Proposed Development area would be expected to take at least 5 – 10 years.

Residual Effects on Water Vole

10.9.11 The majority of water vole habitats identified on the Site are outside the Main Development Area boundary and will therefore not be directly affected. Embedded mitigation to control surface water run-off will ensure that the ditch habitats are not damaged during construction works.

10.9.12 Mitigation to address the low risk of killing/ injury during works to install a culvert on Ditch 3, and to drain and infill Ponds 1 and 2, will deliver legislative compliance for this species in respect of the Wildlife and Countryside Act 1981. No significant residual effects on water vole are therefore anticipated.

Operation

10.9.13 No significant effects on ecology features were identified in the EcIA, and therefore it is concluded that the Proposed Development will not give rise to any significant adverse operational effects on ecology features including the Humber Estuary SAC/ SPA/ Ramsar/ SSSI.

Conclusions

10.9.14 The loss of functionally linked habitat to the Humber Estuary SPA/ Ramsar within the footprint of the Proposed Development will be addressed through the adoption of Policy 9 of the Local Plan to deliver alternative habitat for feeding, roosting and loafing birds via the SHG strategic mitigation pathway. NELC has confirmed that the SHG site at Cress Marsh has been consented and is being constructed over winter 2018/19. The habitat will be in place prior to the commencement of the Proposed Development in late 2019.

10.9.15 Embedded mitigation to control surface water pollution during construction and operation means that there will be no adverse effects on the coastal and marine habitats of the Humber Estuary SAC/ SPA/ Ramsar/ SSSI. Mitigation for noise/ vibration and visual effects during construction will be employed to ensure that there is no disturbance to waterbirds in adjacent fields that are functionally linked to the Humber SPA/ Ramsar. A report to inform HRA for the Proposed Development has therefore

concluded that there will be no adverse effects on the integrity of the Humber Estuary SAC/ SPA/ Ramsar (see Appendix 10G in ES Volume III).

10.9.16 Habitats within the Main Development Area were found to support breeding birds, water vole and otter, and were assumed to support grass snake due to the suitability of the habitat. Mitigation for these species will be employed during construction to avoid killing/ injury and to ensure legislative compliance in respect of the Wildlife and Countryside Act 1981. The assessment has therefore concluded that there will be no significant residual adverse effects on these species.

10.9.17 The loss of semi-improved grassland and two ponds within the Main Development Area will be mitigated through the delivery of replacement, higher quality, habitats in the ecological mitigation and enhancement area to the west of the SHBPS. No significant residual adverse effects on habitats as a result of the construction of the Proposed Development are therefore anticipated.

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