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## Tables

# 13. Ecology and Nature Conservation

## 13.1 Introduction

13.1.1 This chapter of the Environmental Statement (ES) considers the potential effects on ecology and nature conservation of the Proposed Phillips 66 Development and the Proposed VPI Development both separately and cumulatively (the 'Proposed Developments'). The term 'Sites' is used collectively to describe land within the two planning application boundaries, comprising 'the Phillips 66 Site' (the Proposed Phillips 66 Development's planning application boundary) and 'the VPI Site' (the Proposed VPI Development's planning application boundary).

13.1.2 The aim of this assessment is to:

- establish the current baseline ecological conditions at the Phillips Site and the VPI Site;
- identify any potentially significant ecological effects associated with the Proposed Developments;
- set out any measures necessary to effectively avoid or mitigate likely significant effects and to ensure compliance with nature conservation legislation and local planning policy objectives;
- identify ecological enhancement measures that can be delivered by the Proposed Developments; and
- provide an assessment of the significance of any residual effects.

13.1.3 This assessment has been prepared by ESL (Ecological Services) Limited (ESL). Refer to Appendix 1C (ES Volume II) for the Statement of Competence.

13.1.4 This assessment is supported by an Appendix (ES Volume II) and a number of Figures (ES Volume III):

- Appendix 13A Ecological Baseline Report including:
    - Appendix 13A.1 Species List;
    - Appendix 13A.2 Lincolnshire Environmental Record Centre data search; and
    - Appendix 13A.3 SureScreen Scientifics great crested newt (GCN) eDNA Technical Report;
- Figure 13.1 Phillips 66 Site Habitat map;
- Figure 13.2 VPI Site Habitat map;
- Figure 13.3 Waterbodies sampled for GCN eDNA;
- Figure 13.4 Reptile survey;
- Figure 13.5 Winter bird survey compartments;
- Figure 13.6 Bat survey; and
- Figure 13.7 Water vole/ otter survey.

## 13.2 Legislation and Planning Policy Context

### Legislation

13.2.1 This assessment has taken into account the potential effects on statutory and non-statutory ecological sites that are:

- of international importance, comprising Special Protection Areas (SPA) for birds and Special Areas of Conservation (SAC) created under the EC Birds Directive and Habitats Directive, together with sites created under the Ramsar Convention;
- notified as Sites/ Areas of Special Scientific Interest (SSSI/ ASSI) under the Wildlife and Countryside Act 1981 (as amended) (WCA) or relevant national statute by the statutory country nature conservation agency; and/ or
- designated as Local Nature Reserves (LNRs) under Section 21 of the National Parks and Access to the Countryside Act 1949 by principal local authorities.

13.2.2 The assessment has also taken into account habitats and species that are:

- listed in Schedules 1, 5 and 9 of the WCA;
- covered by the Hedgerows Regulations 1997;
- listed as Habitats and Species of Principal Importance by the Secretary of State in accordance with Section 41 (S41) of the Natural Environment and Rural Communities Act 2006 (NERC); and/ or
- listed in the schedules of the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

13.2.3 For statutorily protected species recorded on or considered likely to use the Sites or their immediate surroundings, a summary of legal protection is given in the Ecology and Nature Conservation Baseline Description Appendix (Appendix 13A in ES Volume II).

## National Policy

13.2.4 The National Planning Policy Framework (NPPF) was last revised in 2021 (Ministry of Housing, Communities and Local Government, 2021) and sets out the Government's planning policies for England together with how these are expected to be applied with regard to biodiversity:

- Section 11 'Making effective use of land' sets out the need for strategic planning, which considers the many functions that land parcels may need to fulfil and stresses that multiple benefits, including net environmental gains, should be obtained.
- Section 14 requires that plans should take a proactive approach to adapting to climate change, including implications for biodiversity and landscapes.
- Section 15 of the NPPF includes the requirement for plans to protect and enhance biodiversity by:
  - Identifying and safeguarding local wildlife-rich habitats and wider ecological networks including international, national and local sites of importance for biodiversity and corridors that connect them.
  - Promoting the restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species.
  - Pursuing opportunities for securing measurable net gains for biodiversity.

## Local Policy

13.2.5 The North Lincolnshire Core Strategy, which was adopted in June 2011 (North Lincolnshire Council, 2011), sets out the long-term vision for North Lincolnshire and provides a blueprint for managing growth and development in the area up to 2026. Policies CS5, CS16 and CS17 relate to the protection of biodiversity resources, the maintenance of wildlife networks and green corridors and ensuring ecological enhancement through good design, respectively.

13.2.6 On 11 December 2022, North Lincolnshire Council submitted its draft Local Plan to the Secretary of State for an Examination in Public under Regulation 22 of the Town and Country Planning (Local Planning) (England) Regulations 2012 (North Lincolnshire Council, 2022). Policy DQE3 sets out the aims for biodiversity and geodiversity, with the notable inclusion in Point 8 of "*All schemes shall, as appropriate to their nature and scale, use the DEFRA biodiversity metric to demonstrate that a proposal will deliver a minimum 10% measurable net gain for biodiversity*".

# 13.3 Assessment Methodology

## Overview

13.3.1 The Ecological Impact Assessment (EcIA) has been undertaken in accordance with best practice guidance as issued by the Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2018, Version 2.1). The aims of the EcIA are to:

- identify relevant ecological features that may be impacted as a consequence of the Proposed Developments;
- provide a robust assessment of the likely ecological impacts and resultant effects of the Proposed Developments, which may be beneficial (i.e., positive) or adverse (i.e., negative);
- determine the consequences of the Proposed Developments in terms of national, regional and local policies relevant to nature conservation and biodiversity; and
- set out the steps to be taken to ensure legal compliance.

13.3.2 CIEEM guidance makes it clear that it is not necessary to assess the effects on all habitats and species with potential to occur within the zone of influence of a proposed development, simply those that are 'relevant'. Ecological features that are sufficiently widespread, unthreatened, resilient to project impacts and will remain viable and sustainable can be scoped out, although efforts should still be made to mitigate any adverse effects where possible.

## Defining the Sensitivity of Receptors

13.3.3 In order to inform the EcIA, there is a need to determine the scale at which the ecological features are of value, i.e., the geographical level at which it matters and thus whether they require an impact assessment. The frames of reference used for this assessment, based on CIEEM guidance, are:

- International (generally within a European context).
- National (England).
- Regional (Yorkshire and the Humber).
- County (North Lincolnshire).
- Local (Immingham).
- Site (below local).

13.3.4 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.

## Defining Impacts and Effects

13.3.5 In-line with the CIEEM guidance, the terminology used within this EcIA defines impacts and effects as follows:

- impact: actions resulting in changes to an ecological feature, for example, the removal of a hedgerow used by nesting birds and
- effect: an outcome resulting from an impact, for example, the damage or destruction of a nest with eggs or young or reducing the availability of breeding habitat that may lead to an adverse effect on the conservation status of the species or population concerned.

## Significance Criteria

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

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

13.3.7 Significant effects (both adverse and beneficial) have been qualified with reference to the geographic scale at which the effect is significant (e.g., an adverse effect significant at a national level).

13.3.8 The CIEEM approach does not adopt a fixed-matrix approach to classify effects as this deviates from CIEEM guidance. To provide consistency with other assessments, the findings of the CIEEM assessment have been translated into the classification of effects scale and magnitude as outlined in Table 13.1.

13.3.9 Any significant adverse effects will be mitigated or compensated for (where they cannot be avoided), whilst ecological enhancements are recommended where appropriate to meet planning policy objectives. Following the implementation of any mitigation and compensation, as appropriate, residual effects on ecological features have been identified.

**Table 13.1: Relating CIEEM assessment terms to those used in other ES chapters.**

| Effect Classification | Magnitude | Equivalent CIEEM Assessment Criteria |
|---|---|---|
| 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. |
| | Negligible. | 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. |

## Extent of the Study Area

13.3.10 The zone of influence for the Proposed Developments is the area over which ecologically valuable sites, habitats or species may be affected by environmental changes resulting from the Proposed Developments and associated activities. For statutory and non-statutory designated sites (and for some species) present outside the Sites boundaries, the potential zone of influence is reflected in the area of search of the desk study.

13.3.11 The minimum study area for all ecological field surveys comprises all land within each Site. For specific surveys, the study area was expanded to include some adjacent land, for example, the great crested newt survey considered waterbodies within 250 m of the Sites with suitable habitat connectivity.

## Sources of Information/ Data

13.3.12 The Lincolnshire Environmental Records Centre (LERC) was asked to provide a data report containing information on any internationally protected sites and for citations of any Sites of Special Scientific Interest (SSSI) or National Nature Reserves (NNR) within 5 km of the Sites.

Information was also requested on any Local Nature Reserves (LNR) or Local Wildlife Sites (LWS) within a 2 km radius of the Sites together with records of any protected or notable species within a 2 km search area of the Sites.

13.3.13 The Ecology Chapter of the ES prepared by AECOM in 2018 to inform the VPI Immingham Open Cycle Gas Turbine (OCGT) project was reviewed and survey results from that ES are referred to where germane to this assessment (VPI, Immingham, 2019, used with permission).

13.3.14 A Preliminary Ecological Appraisal (PEA) was undertaken in June 2021 by ESL. All habitats and plant communities within the Sites were mapped and characterised by identifying the dominant and typical species and are described using the UK Habitat Classification System (Butcher *et al.*, 2020). All hedgerows were assessed for importance as defined by the Hedgerow Regulations 1997 and a search was made for any non-native invasive plant species such as Japanese knotweed. The PEA included an assessment of all habitats for their suitability for use by a range of protected species in order to design the scope of further investigations as set out in Table 13.3.

13.3.15 Wintering bird surveys were undertaken in 2021/2022 on land to the east of Rosper Road to inform a separate project, although the data collected are relevant to this ecological impact assessment and to the report to inform a Habitats Regulations Assessment, which accompanies this application, due to the potential for indirect noise and visual impacts during construction and operation of the Proposed Developments.

**Table 13.2: Survey scope, methods and timings.**

| Survey | Study Area | Methods | Timings |
|---|---|---|---|
| Habitat updates. | Habitats within and adjacent to the Sites boundaries. | UK Habitat Classification System (Butcher *et al.*, 2020). | May to July 2022. |
| Invertebrate scoping assessment. | Habitats within and adjacent to the Sites boundaries. | Standard methods. | 9 July 2021. |
| Dingy skipper and wall brown butterfly assessment. | Suitable habitats within the Sites. | Standard methods. | 23 May 2022. |
| Great crested newts. | Suitable waterbodies with habitat connectivity within 250 m of each Site. | Habitat Suitability Index (HSI) (Oldham *et al.*, 2000).<br>eDNA sampling (Biggs *et al.*, 2014). | 17 May 2021. |
| Reptiles. | Suitable habitats within the Sites. | Seven-visit presence/absence survey using artificial refugia (HGBI, 1998). | 22 June to 24 September 2021. |
| Breeding birds. | Habitats within and adjacent to the Sites boundaries. | Six-visit Common Bird Census (CBC) survey (Marchant, 1983). | 11 April to 20 June 2021. |
| Wintering birds. | Habitats within and adjacent to the Sites boundaries. | Two surveys per month across high- and low-tide periods. | October 2021 – March 2022. |
| Bats. | Habitats within and adjacent to the Sites boundaries. | PEA and activity surveys (static detectors) (Collins, 2016). | Nine nights in July, August and September 2021. |

| Survey | Study Area | Methods | Timings |
|---|---|---|---|
| Badgers. | Habitats within and adjacent to the Sites boundaries. | Search for setts, dung pits/latrines and pathways (Harris *et al*., 1994). | May 2021, then each site visit. |
| Water voles/ otters | Internal Drainage Board (IDB) managed drain (South Killingholme Drain) within the VPI Site to Rosper Road Pools and South Killingholme Drain along east side of VPI Site Rosper Road. | Channel waded and searched for burrows, latrines and feeding remains (Dean *et al*. 2016). | June and August 2021. |

13.3.16 The following species were scoped out of this assessment:

- white-clawed crayfish and dormouse. Neither species is known to occur in North Lincolnshire and there is no suitable habitat on or adjacent to either Site.

## Limitations

13.3.17 The baseline and assessments presented in this report are based on the best contemporary data available at the time of the EcIA however, the following assumptions and limitations are identified:

- data provided by biological records centres are often subject to the spatial coverage of biodiversity recording schemes, many of which are not carried out in a systematic way. These data frequently do not include negative survey data (data showing where surveys have been undertaken but where there have been nil returns). In particular, certain areas (e.g., nature reserves) are likely to have been heavily recorded because of the volume of naturalists that visit them, whereas other areas (e.g., private farmland) are less likely to have been studied. For this reason, the absence of desk study records for a species has not been taken to indicate absence of the species.
- desk study records have been used alongside habitat and species data; known/ anticipated species distributions were used to infer whether these species may be present. The desk study has been used to inform the field survey scope and has been subsequently updated by the field surveys.
- where the field surveys do not provide conclusive evidence for the presence or absence of a particular species, professional judgement has been used to inform the assessments based on aerial imagery, collated habitat data and desk study data results of surveys conducted within neighbouring similar habitats (where such information is available).

## Consultation

13.3.18 A scoping opinion was received from North Lincolnshire Council on 22 March 2022, which required provision of the information reasonably required for a Habitats Regulations Assessment (HRA). Furthermore, it was agreed that ecology and nature conservation should be scoped into the assessment and that the commitment to provide 10% biodiversity net gain was welcomed. The full scoping opinion is provided in Appendix 1B in ES Volume II.

13.3.19 Requests for advice from Natural England under a Discretionary Advice Service agreement were rejected due to resourcing challenges at Natural England, but a meeting was held with Natural England on 21st November 2022 to provide a summary of the Proposed Developments and the EcIA and HRA findings.

13.3.20 Potential mechanisms to deliver Biodiversity Net Gain are currently being explored with a number of stakeholders including Phillips 66 (Simon Horriben, Senior Environmental Consultant), North Lincolnshire Council (Andrew Taylor, Natural Environment Policy Specialist), Humber Nature Partnership (Darren Clarke, Manager), Lincolnshire Wildlife Trust (Tammy Smalley, Head of Conservation) and The Environment Bank (Natasha Hanbury, Land

and Sales Project Coordinator). Discussions to date have been informal and will be developed further. Each applicant will mitigate the effects of their own Proposed Development.

# 13.4 Baseline Conditions

## Existing Baseline

13.4.1 The ecological baseline relevant to each of the Proposed Developments is set out below. Having reviewed the desk study information and undertaken a walkover of each Site, the topics considered a material consideration for each assessment are:

- Phillips 66 Site –
  - sites designated for nature conservation,
  - habitats and plant species (including non-native invasive species), and
  - breeding birds (only where the Phillips 66 Site overlaps with the VPI Site); and
- VPI Site –
  - sites designated for nature conservation,
  - habitats and plant species (including non-native invasive species),
  - invertebrates,
  - great crested newts,
  - reptiles,
  - breeding birds,
  - wintering birds,
  - bats,
  - badgers,
  - water voles, and
  - otters.

13.4.2 Where the two Sites overlap to the east of the tree-lined railway corridor, there is the potential for each of the Proposed Developments to have an adverse effect on the same breeding bird assemblage. For assessment purposes, the species assemblage recorded using this habitat is considered an important ecological feature of both Sites.

13.4.3 Full details of the survey methodologies and results, together with figures, are provided in Appendix 13A. English names for species are used throughout the text with a full list of all species recorded from each Site, together with their scientific names, given in Appendix 13A.1 (ES Volume II). Where names of species not recorded are referred to, the scientific name is also given in the text. English and scientific names for higher plants are given according to Stace (Stace, 2019).

### Phillips 66 Site

#### *Designated Sites of Nature Conservation Importance*

13.4.4 Sites with nature conservation designation and their proximity to the Sites are set out on Table 13.3. Reports to inform HRAs, undertaken in order to determine any Likely Significant Effects

(LSE) on the Humber Estuary European Marine Site (EMS), have been prepared and accompany the planning applications for each of the Proposed Developments.

**Table 13.3: Designated sites within the zone of influence and their conservation importance and geographic location to the Phillips 66 Site.**

| Site name/ Designation | Features of Interest and Conservation Importance | Distance from the Phillips 66 Site |
|---|---|---|
| Humber Estuary EMS, SPA, SAC, Ramsar site. | A range of coastal habitats including mud and salt flats, lagoons, salt marshes and coastal sand dunes, which provide feeding and roosting opportunities for important numbers of waterbirds in non-breeding season. Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis* and grey seal *Halichoerus grypus* are also designated features of the SAC. **International importance.** | 1.50 km east. |
| North Killingholme Haven Pits SSSI, LWS. | Flooded clay pits that support several rare invertebrate species and provide habitat for a range of birds, including a high-tide roost for waders. **National importance.** | 2.7 km north. |
| Rosper Road Pools LWS. | A large area of open water and associated edge habitat with islands. It supports many breeding and wintering birds and water voles. **County Importance.** | 500 m east. |
| Burkinshaw's Covert LWS. | A large area of woodland comprising older and more recent areas of plantation. Open and/or wet habitats provide botanical interest. **County Importance.** | 900 m north-west. |
| Mayflower Wood Meadow LWS. | A small area of ridge-and-furrow unimproved neutral grassland. **County Importance.** | 800 m south-west. |
| East Field Road Railway Embankment LWS | A small area of sheltered, botanically-rich woodland glades on the north side of the railway line. **County Importance.**<br>Margaret Haggerty, GLNP Information Officer (pers. comm. 10 November 2022), states that '*it is still a LWS but hasn't been resurveyed or reassessed since it stopped being a LWT reserve in 2018. The assumption is that any management work has reverted to Network Rail as the landowner*'. | 120 m north-west. |

## *Habitats and Plant Species*

13.4.5 Most of the Phillips 66 Site lies within current operational areas. A habitat map is provided as Figure 13.1 (ES Volume III).

### Trees and Scrub

13.4.6 The operational areas are dominated by buildings, refinery infrastructure and hardstanding. Limited disturbed ground vegetation, such as bramble scrub and very young self-set saplings, is present around the periphery of the Phillips 66 Site and in areas used for temporary materials storage. The northern edge of the operational areas is bound by the railway corridor, which comprises areas of ballast with sparse, low-growing ruderals. These areas are of **Negligible** nature conservation value.

13.4.7 Along either side of the railway that runs between the Phillips 66 Site and VPI Site is a tree belt with a canopy dominated by ash over elder with very sparse ground flora. This is the only point at which the two Sites overlap. This tree belt does not qualify as an S41 Lowland Mixed Deciduous Woodland Habitat of Principle Importance under NERC (hereafter referred to as S41 habitat) but it does provide habitat for invertebrates, nesting birds and bats and is considered of **Local** nature conservation value.

### Hedgerows

13.4.8 The western Phillips 66 Site boundary along Eastfield Road comprises an unmanaged hawthorn hedgerow featuring abundant hawthorn with occasional cherry and dog rose. The hedgerow does not qualify as 'Important 'under the Hedgerow Regulations 1997 but all non-ornamental hedgerows are designated as S41 habitats and are of **County** nature conservation value.

### Breeding Birds

13.4.9 The only habitats on the Phillips 66 Site suitable for use by breeding birds are the section of hedgerow along Eastfield Road and a section of the tree belt to the north-east of the Network Rail railway line, which will remain intact. As such, a dedicated breeding bird survey of the Phillips 66 Site was considered unnecessary. The species using the roadside hedgerow can reasonably be predicted to be common and widespread in the local area. Species using the tree belt between the two Sites were recorded during a breeding bird survey of the VPI Site in spring 2022 and are presented in the VPI breeding bird baseline. The likely breeding bird assemblage is considered of **Site** level nature conservation value and has not been taken forward for assessment.

### *Summary of Important Ecological Features of the Phillips 66 Site*

13.4.10 The important ecological features of the Phillips 66 Site are set out in Table 13.4, together with the geographical context over which they are considered important. Features considered important at a less than Local level are not carried forward to the assessment stage as they are unlikely to be subject to effects that would constitute a material consideration in determining the application.

**Table 13.4: Summary of importance ecological features of the Phillips 66 Site.**

| Important Feature | Geographic Context | Justification |
|---|---|---|
| Humber Estuary EMS. | International importance. | Conservation status. |
| Killingholme Haven Pits SSSI. | National importance. | Conservation status. |
| East Field Road Railway Embankment LWS. | County importance. | Conservation status. |
| Hedgerows. | County importance. | S41 habitat. Short section lost due to the Proposed Phillips 66 Development. |

## VPI Site

### Sites Designated for Nature Conservation

13.4.11 The designated sites and their conservation importance are the same as those under consideration for the Phillips 66 Site (only the proximities differ). These are presented in Table 13.5.

**Table 13.5: Designated sites within the zone of influence and their conservation importance and geographic location to the VPI Site.**

| Site name/ Designation | Features of Interest and Conservation Importance | Distance from the VPI Site |
|---|---|---|
| Humber Estuary EMS, SPA, SAC, Ramsar site. | A range of coastal habitats including mud and salt flats, lagoons, salt marshes and coastal sand dunes, which provide feeding and roosting opportunities for important numbers of waterbirds in non-breeding season. Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis* and grey seal *Halichoerus grypus* are also designated features of the SAC. **International importance.** | 1.50 km east. |

| Site name/ Designation | Features of Interest and Conservation Importance | Distance from the VPI Site |
|---|---|---|
| North Killingholme Haven Pits SSSI, LWS. | Flooded clay pits that support several rare invertebrate species and provide habitat for a range of birds, including a high-tide roost for waders. **National importance.** | 2.22 km north. |
| Rosper Road Pools LWS. | A large area of open water and associated edge habitat, with islands. It supports many breeding and wintering birds and water voles. **County Importance.** | 130 m east. |
| Burkinshaw's Covert LWS. | A large area of woodland comprising of older and more recent areas of plantation. Open and/or wet habitats provide botanical interest. **County Importance.** | 660 m north-west. |
| Mayflower Wood Meadow LWS. | A small area of ridge-and-furrow unimproved neutral grassland. **County Importance.** | 1.2 km south-west. |
| East Field Road Railway Embankment LWS | A small nature reserve on the northern side of the railway line with sheltered, botanically-rich woodland glades. **County Importance.** | 1.2 km west. |

### *Habitats and Plant Species*

13.4.12 The VPI Site comprises part of the current VPI Immingham CHP Plant operational area and a large mosaic of habitat types to the south as illustrated in Figure 13.2.

#### Grassland

13.4.13 The most abundant habitats on the VPI Site are nutrient-rich and species-poor grassland dominated by coarse grasses including areas of false oat-grass grassland, tufted hair-grass grassland, stands of common reed, mosaics of dominant club rush, hard rush or common spike rush and tall-herb dominated areas that include species such as great willowherb, creeping thistle and common nettle.

13.4.14 Toward the south, the sward is more open and supports Yorkshire fog, tufted hair-grass, teasel, creeping thistle, creeping buttercup and silverweed, together with occasional other fine grasses, common herbs and patches of bare ground.

13.4.15 Along the south-eastern boundary of the VPI Site, the grassland is relatively open, free-draining and diverse, with frequent grasses such as Yorkshire fog and occasional crested dog's-tail and cock's-foot. Herbs include frequent black medic, oxeye daisy, common bird's-foot trefoil and occasional yarrow, common knapweed, selfheal, lady's bedstraw, common daisy, common spotted orchid and yellow-wort.

13.4.16 The grassland is evaluated as being of **Local** nature conservation value but is elevated to **County** level value due to its large area and the habitat it provides for the assemblage of S41 birds, S41 small heath butterfly and opportunities for foraging bats.

#### Open Mosaic Habitat

13.4.17 Immediately to the south of the VPI facility is a large area of broken ground (around 4ha) that is developing a range of early successional 'open mosaic habitats' (OMH). For the most part, this area comprises an unvegetated gravelled substrate but areas of botanical interest include species such common spotted orchid, southern marsh orchid, yellow-wort, mouse-ear hawkweed, common centaury, hare's-foot clover and fern grass, as well as frequent non-natives such as narrow-leaved ragwort. Self-set silver birch and willow scrub is present in the south-eastern corner.

13.4.18 The topography is flat with little-to-no variation, which limits the niches often associated with more ecologically valuable brownfield land. As a result, any areas of standing water or wet ground are likely transient. Had this large area of OHM comprised less unvegetated gravel and more herb cover, it would likely have warranted County level importance due to the species diversity and the opportunities this habitat mosaic provides for invertebrates and birds however, as it stands, given the high proportion of bare ground, it is currently evaluated as being of **Local** nature conservation value.

### Trees and Scrub

13.4.19 A broadleaved tree belt comprising ash over young hawthorn, goat willow and elder runs along the railway and is encroaching into the south-west of the VPI Site.

13.4.20 Small parcels of species-poor mixed scrub, comprising hawthorn and bramble with occasional dog rose and goat willow, are scattered throughout the VPI Site. Bramble scrub forms large areas of homogenous coverage as well as being a common secondary feature of other habitat types. The trees and scrub are evaluated as being of **Site** level value for nature conservation.

### Standing Water and Watercourses

13.4.21 There are no permanent waterbodies on the VPI Site. South Killingholme Drain runs through the VPI Site west-to-east, where it is culverted under Rosper Road and empties into Rosper Road Pools LWS. The drain carries waste water from the adjacent industrial operations and is highly nutrient-enriched. Aquatic and marginal vegetation is limited to fennel-leaved pondweed and fool's watercress. Bankside vegetation comprises tall herbs to both banks and mixed scrub on the north bank. The drain is evaluated as being of **Site** level value for nature conservation. A roadside drain runs along the western side of Rosper Road, flowing into the IDB drain near the culvert under Rosper Road. It is narrow, shallow and eutrophic as a result of road run-off and is of **Negligible** nature conservation value.

### Plant Species

13.4.22 No S41 species or nationally rare or nationally scarce plant species, as defined by Wigginton (1999) and Stewart, Pearman and Preston (1994) respectively, were found. The only plant species recorded on the VPI Site listed above the '*Least Concern'* threat level in the British Red Data Book (Stroh *et al*., 2014) is common cudweed *Filago vulgaris*, which was found in two open areas south of the CHP Plant. No invasive, non-native plant species were recorded on the VPI Site. The plant assemblage is evaluated as being of **Site** level value for nature conservation.

### Invertebrates

13.4.23 Site walkovers in July 2021 and 23 May 2022 did not identify colonies of dingy skipper or wall brown butterflies (both S41 species).

13.4.24 Although no site is devoid of invertebrate interest, owing to a lack of niches or variation in habitat and features, the bulk of the VPI Site provides few opportunities for a rich invertebrate assemblage or scarce species.

13.4.25 The area between South Killingholme Drain and the existing CHP Plant comprises mosaics that suggest at least a moderate invertebrate assemblage could be present, although it is considered unlikely this area supports permanent colonies of either dingy skipper or wall butterfly. Small heath butterfly (an S41 species) was however present in numbers in the south-eastern part of the VPI Site where the grasses were finer. This butterfly has shown a severe decline over the long term and is therefore a high priority species for conservation efforts (Butterfly Conservation, 2022). Invertebrate species recorded during the site visit on 23 May 2022 are given in Table 13.6. The VPI Site is likely of **County** nature conservation value for small heath butterfly.

**Table 13.6: Invertebrate species recorded during the site visit on the 23 May 2022.**

| Vernacular name | Scientific name | UK Status |
|---|---|---|
| Cinnabar moth. | *Tyria jacobaeae* | NERC Section 41 (research only). |
| Common blue. | *Polyommatus icarus* | |
| Drinker moth (caterpillar). | *Euthrix potatoria* | |
| Lackey moth (caterpillar). | *Malacomsoma neustria* | |
| Mother Shipton. | *Callistege mi* | |

| Vernacular name | Scientific name | UK Status |
|---|---|---|
| Painted lady. | *Vanessa cardui* | |
| Peacock. | *Aglais io* | |
| Small heath. | *Coenonympha pamphilus* | NERC Section 41. |
| Small tortoiseshell. | *Aglais urticae* | |

## Great Crested Newts

13.4.26 The desk study identified over 100 records for great crested newt (GCN) within the search area with many from the last 10 years. Whilst the resolution of these records was low, it is clear when overlaid on an OS map that many are duplicate entries for the same ponds, often in multiple different years, most likely from Natural England survey licence returns.

13.4.27 The closest records for GCNs are for ponds off Station Road, approximately 1.1km north of the VPI Site however, in 2015, the population was translocated to a new receptor area in a small triangular portion of land off Rosper Road adjacent to Chase Hill Wood, 2.2km northwest of VPI Site under Natural England licence number 2014-1559-EPS-MIT GCN.

13.4.28 Water samples taken from six waterbodies in 2018 to inform the adjacent VPI OCGT application all returned a negative result for GCN eDNA.

13.4.29 Water samples taken from six different waterbodies in 2021 to inform the current application also returned a negative result for GCN eDNA.

13.4.30 The results of both surveys are given in Tables 13.7 and 13.8 respectively and the locations of all 12 waterbodies sampled for GCN eDNA are illustrated on Figure 13.3 (ES Volume III). The technical report containing the results of the 2021 sampling is provided in Appendix 13A.3.

**Table 13.7: GCN e-DNA and HSI survey results of waterbodies in 2018 in the vicinity of the VPI Site**

| Ref | Waterbody Type | Grid Reference | HSI Score | eDNA Result |
|---|---|---|---|---|
| 1 | Flooded part of site. | TA 167 175 | Excellent. | Negative. |
| 2 | Flooded part of site. | TA 168 174 | Good. | Negative. |
| 3 | TLOR process lagoon. | TA 164 173 | Good. | Not sampled. |
| 4 | Flooded part of site. | TA 166.174 | Average. | Negative. |
| 5 | Flooded archaeology trial trench. | TA.166.174 | Below average. | Negative. |
| 6 | Flooded archaeology trial trench. | TA 165.173 | Poor. | Negative. |

**Table 13.8: GCN eDNA and HSI survey results of waterbodies in 2021 in the vicinity of the VPI Site**

| Ref | Waterbody Type | Grid Reference | HSI Score | eDNA Result |
|---|---|---|---|---|
| 1 | Highway surface water attenuation pond. | TA 17182 16876 | Average. | Negative. |
| 2 | Pond in Rosper Road Pools complex. | TA 17240 16920 | Excellent. | Negative. |

| Ref | Waterbody Type | Grid Reference | HSI Score | eDNA Result |
|---|---|---|---|---|
| 3 | Pond in Rosper Road Pools complex. | TA 17269 16908 | Excellent. | Negative. |
| 4 | Non-flowing ditches (linear ponds). | TA 17353 17145 | Average. | Negative. |
| 5 | Non-flowing ditches (linear ponds). | TA 17614 17179 | Average. | Negative. |
| 6 | Phillips 66 process pond on Marsh Lane. | TA 17737 17492 | Poor. | Negative. |

13.4.31 The majority of GCN records in the search area have originated from ecological consultants undertaking surveys in accordance with published guidelines to inform planning applications or as part of population monitoring. As a result, they are likely to be reliable and provide an accurate distribution of GCNs in the local area. The eDNA results from 2021 (and 2018) confirm that GCNs are absent from all suitable waterbodies with habitat connectivity to the VPI Site and as such, no further consideration is given to GCNs in this assessment.

### Reptiles

13.4.32 The desk study provided just four reptile records for the search area: three for grass snake and one for slow worm, all from 1977 and at a 1 km resolution.

13.4.33 No reptiles were recorded during a standard seven-visit presence/absence reptile survey to inform the adjacent VPI OCGT application in 2018.

13.4.34 No reptiles were found on or under any tin and none was seen by direct observation during the surveys in 2022 to inform the current assessment.

13.4.35 Whilst the VPI Site has habitats that are suitable for use by common reptile, surveys in 2018 and 2022 were both undertaken using the same standard methods and in suitable weather conditions and both failed to detect any reptiles. Consequently, they are presumed not to occur. As such, no further consideration is given to reptiles in this assessment.

### Breeding Birds

13.4.36 The desk study provided 10,449 bird records for the search area from 1997 to 2017. Considering the amount of commercial survey work that has been undertaken in the area since 2017, more records are likely to exist. The majority of records are associated with statutory sites including the Humber Estuary EMS, Killingholme Haven Pits SSSI and Rosper Road Pools LWS but others originate from commercial survey work to inform planning applications so the vast majority are likely to be from reliable sources.

13.4.37 Thirty-six bird species were recorded at the VPI Site in 2022. This list included two Schedule-1 species: little ringed plover (which was recorded breeding on VPI Site) and fieldfare (a winter visitor, which was using the VPI Site for foraging).

13.4.38 Seven S41 Species of Principal Importance were recorded, namely lapwing, skylark, song thrush, dunnock, bullfinch, linnet and reed bunting; there is suitable breeding habitat within the VPI Site for all seven species.

13.4.39 Six Red List species were recorded, namely lapwing, skylark, fieldfare, song thrush, bullfinch and linnet. Fourteen Amber List species were recorded, namely mallard, stock dove, wood pigeon, snipe, sparrowhawk, kestrel, sedge warbler, whitethroat, wren, wheatear, dunnock, grey wagtail, meadow pipit and reed bunting. There is suitable nesting habitat within the VPI Site for some/most of these Red- and Amber-listed species.

13.4.40 The numbers of each species considered as confirmed, probable or possible breeders recorded on each visit are given in Table 13.9. Species considered to be using the VPI Site for feeding or simply passing through as migrants are omitted from this table.

**Table 13.9: Numbers of confirmed, probable or possible breeding birds recorded on Site during the 2022 breeding bird surveys.**

| Species | Survey dates | | | | | | Likely No. of pairs |
|---|---|---|---|---|---|---|---|
| | Visit 1 11/04/'22 | Visit 2 22/04/'22 | Visit 3 09/05/'22 | Visit 4 25/05/'22 | Visit 5 08/06/'22 | Visit 6 20/06/'22 | |
| Mallard** | 0 | 4 | 1 | 0 | 0 | 0 | 1 |
| Kestrel** | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| Little egret | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Sparrow hawk** | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Pheasant | 1 | 1 | 0 | 2 | 2 | 3 | 1 |
| **LITTLE RINGED PLOVER** | 0 | 2 | 1 | 1 | 0 | 0 | 1 |
| **Lapwing*** | 3 | 4 | 4 | 3 | 2 | 3 | 2 |
| Snipe** | 5 | 2 | 0 | 0 | 0 | 0 | 0 |
| Woodpigeon** | 3 | 2 | 2 | 1 | 0 | 7 | 2-3 |
| Stock dove** | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Skylark*** | 0 | 0 | 2 | 0 | 1 | 2 | 1-2 |
| Meadow pipit** | 2 | 0 | 0 | 1 | 0 | 0 | 1? |
| Chaffinch | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Pied wagtail | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| Grey wagtail** | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wren** | 9 | 4 | 5 | 9 | 7 | 8 | 6-8 |
| **Dunnock**** | 4 | 1 | 3 | 3 | 2 | 1 | 1-2 |
| Robin | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| Wheatear** | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Blackbird | 2 | 1 | 0 | 1 | 0 | 3 | 1-2 |
| **Song thrush*** | 0 | 1 | 0 | 1 | 0 | 0 | 1? |
| Blackcap | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| Lesser whitethroat | 0 | 0 | 0 | 1 | 0 | 2 | 1 |
| Whitethroat** | 0 | 1 | 5 | 3 | 2 | 5 | 2 |
| Chiffchaff | 4 | 1 | 1 | 1 | 0 | 0 | 1 |

| Species | Survey dates | | | | | | Likely No. of pairs |
|---|---|---|---|---|---|---|---|
| | Visit 1 11/04/'22 | Visit 2 22/04/'22 | Visit 3 09/05/'22 | Visit 4 25/05/'22 | Visit 5 08/06/'22 | Visit 6 20/06/'22 | |
| Reed warbler | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| Sedge warbler** | 0 | 3 | 5 | 6 | 3 | 5 | 2-3 |
| Long-tailed tit | 0 | 2 | 0 | 3 | 0 | 0 | 1? |
| Great tit | 3 | 0 | 0 | 0 | 0 | 2 | 0 |
| Blue tit | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Carrion Crow | 1 | 3 | 1 | 2 | 1 | 0 | 1? |
| Magpie | 0 | 0 | 1 | 2 | 2 | 1 | 1 |
| Goldfinch | 1 | 6 | 0 | 0 | 0 | 3 | 1 |
| **Linnet*** | 4 | 5 | 4 | 5 | 3 | 7 | 2-3 |
| **Bullfinch*** | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| **Reed bunting**** | 2 | 5 | 4 | 3 | 1 | 2 | 2 |

KEY: Species names shown in bold are S41 Species of Principal Importance. Those in capitals are birds on Schedule-1 of the WCA. Red List species shown with * and Amber List species with ** (Birds of Conservation Concern, 2015).

13.4.41 All the birds recorded are relatively common, widespread and typical of the habitats at the VPI Site. The assemblage of S41, Red- and Amber-listed species is considered relatively good and is attributed to the range of habitats present and the overall size of the VPI Site. The key habitats for most nesting birds are the tall ruderal/scrub, railway corridor tree belt woodland strips and areas of scrub (for warblers, thrushes, tits and finches); the reed-fringed areas are also of importance for species such as reed buntings. The more open rough-grassland areas are important nesting habitats for species such as skylark.

13.4.42 Of particular note is the area of broken ground with patches of tufty grassland immediately south of the existing CHP Plant, which supported a pair of breeding little ringed plover and two pairs of breeding lapwing.

13.4.43 The VPI Site is evaluated as being of **Local** nature conservation value for its breeding bird assemblage.

## Wintering Birds

### *Summary of Desk Study Data*

13.4.44 Ornithological baseline data to support the EcIA have been obtained from a range of sources. This has included both ornithology surveys undertaken specifically for the Proposed Developments (including land within and adjacent to the Sites), as well as a desk-based review of publicly-available ornithological data, e.g., reports submitted as part of the nearby Able Marine Energy Park (AMEP) scheme and any other relevant applications on the North Lincolnshire Council planning portal.

13.4.45 The Humber Estuary 5-year peak mean counts for each of the key species has been summarised in Table 13.10 below as this enables the 1% threshold (at which a site/area may be considered important to that species within the context of the Humber Estuary) to be calculated. These data are presented in the annual Wetland Birds Survey (WeBS) reports published online (Frost *et al*., 2021).

**Table 13.10: Qualifying species relevant to North Killingholme Marshes – Humber Estuary 5-year peak mean populations (wintering).**

| Species | GB Population | Humber Estuary 5-year Peak Mean Population at SPA Designation 1996/ 97 – 2000/ 01[1] | Humber Estuary 5-year Peak Mean Population[2] 2015/16 – 2019/ 20 | 1% Threshold Humber Estuary Population | Peak Month in Humber Estuary |
|---|---|---|---|---|---|
| Bar-tailed godwit | 29,575 | 2,752 | 1,561 | 16 | February |
| Black-tailed godwit | 40,798 | 1,113 | 4,545 | 45 | September |
| Curlew | 63,067 | (assemblage) | 2,787 | 28 | January |
| Dunlin | 246,985 | 22,222 | 15,954 | 160 | August |
| Golden plover | 145,083 | 30,709 | 31,237 | 312 | December |
| Lapwing | 272,630 | (assemblage) | 16,453 | 165 | December |
| Oystercatcher | 216,625 | (assemblage) | 5,816 | 58 | October |
| Pink footed goose[3] | 493,416 | N/A | 14,345 | 143 | October |
| Redshank | 74,939 | 4,632 | 2,881 | 29 | September |
| Shelduck | 44,844 | 4,464 | 4,515 | 45 | October |
| Teal | 157,059 | (assemblage) | 3,757 | 38 | October |
| Wigeon | 376,708 | (assemblage) | 2,672 | 27 | February |

### *AMEP Ornithology Data*

13.4.46 Given the large land take associated with the consented AMEP scheme in the North Killingholme Marshes area (some of which was considered functionally-linked to the SPA/ Ramsar site) and its proximity to other functionally-linked land to the south of AMEP, there have been many surveys of the terrestrial fields and North Killingholme Marshes foreshore area over several years associated with this application. A desk study review of these data was undertaken to provide further insight into the longer-term history of waterbird usage of the North Killingholme Marshes area to support conclusions drawn from the ESL surveys in 2021/2022.

13.4.47 A summary of the AMEP reports/ data reviewed is as follows, and the data is summarised in Table 13.11 and Table 13.12 below:

- Able Marine Energy Park: Area K Monopole Factory Habitats Regulations Assessment Report (August 2021) prepared by Ecology Consulting on behalf of Able UK Ltd, which contained the following data –
    - survey data from the Killingholme Fields collected during winter 2020/ 2021,
    - breeding bird surveys undertaken at the site during May-August 2021 and specific surveys to determine the current status of marsh harriers and their use of the AMEP site,

[1] Humber Estuary SPA citation (August 2007)
[2] Frost, T.M., Calbrade, N.A., Birtles, G.A., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. and Austin, G.E. 2021. *Waterbirds in the UK 2019/20: The Wetland Bird Survey*. BTO/RSPB/JNCC. Thetford.
[3] Although not a qualifying species for the Humber Estuary SPA/ Ramsar site, this species has been included on the basis that Natural England now consider pink-footed goose to be part of the SPA/ Ramsar site designated assemblage due to the increases in numbers in this area

  - data from previous surveys of the Killingholme Fields undertaken between 2006 and 2011 included in Chapter 11 of the AMEP Development Consent Order (DCO) ES and during autumn 2016 (Cutts and Hemingway, 2017);

- British Trust for Ornithology (BTO) WeBS high-tide (core) counts for Killingholme Marshes Foreshore (2014-2015 to 2019-2020);
- BTO WeBS low-tide counts for Killingholme Marshes Foreshore (November 2011 through to February 2012), the most recently available low-tide counts;
- Site-specific surveys of the Killingholme Marshes Foreshore undertaken by JBA (JBA, 2019) during the 2017-2018 autumn and winter. This included –
  - Autumn passage – autumn migration. Weekly visits between late September and November,
  - Winter - two surveys per month between October and March inclusive, and
  - Spring passage – spring migration. Weekly visits between March and mid-May inclusive;
- ABP data 2018-2019 and 2019-2020 - tide counts of the Killingholme Marshes Foreshore, twice-monthly from October through to March; and
- Survey data from the Killingholme Marshes Foreshore collected by Cutts and Hemingway during winter 2020-2021.

**Table 13.11: Summary of AMEP ornithology data for North Killingholme Marshes Fields from desk study review.**

| Survey | Survey Period | Species Recorded | Comments |
|---|---|---|---|
| Wintering surveys of North Killingholme Marshes Fields for AMEP DCO. | Winter 2006 – 2011. | Curlew. | Peak of 106 equivalent to 2.4% of the Humber Estuary population at the time. |
| | | Redshank, black-tailed godwit, lapwing, whimbrel, shelduck. | Recorded at numbers <1% of the Humber Estuary population. |
| Wintering surveys of North Killingholme Marshes Fields for AMEP DCO. | Autumn 2016. | Curlew. | Peak of 15 in AMEP site indicating reduced numbers when compared with previous surveys, thought likely to be due to longer sward (arable/improved grassland had reverted to more rank neutral grassland in the absence of agricultural management).<br>Surveys recorded peak of 110 curlew in fields at the Tank Farm to the north of AMEP site, indicating curlew still present in area but preferring other fields. |
| Wintering surveys of North Killingholme Marshes Fields for Monopole Facility. | December 2020 – May 2021 | Curlew. | Peak of 45 in site boundary equivalent to 1.6% of Humber Estuary population, indicating land is still functionally-linked to the estuary. |
| | | Lapwing, snipe. | Recorded in numbers <1% Humber Estuary population. |
| | | Teal, mallard, marsh harrier, oystercatcher, redshank. | Single or low numbers (<10 birds) recorded. |

**Table 13.12: Summary of ornithology data for North Killingholme Marshes Foreshore from desk study review.**

| Survey | Survey Period | Species Recorded | Comments |
|---|---|---|---|
| North Killingholme Marshes Foreshore WeBS Sector (high-tide). | Five year mean peak count 2015/ 16 – 2019/ 20. | Black-tailed godwit. | Key feeding habitat in the estuary for this species, numbers occurring at 33.5% of Humber Estuary population. |
| | | Shoveler, little ringed plover, moorhen, coot. | Species occurring in numbers >10% of the Humber Estuary population. |
| | | Mute swan, shelduck, gadwall, mallard, teal, little grebe, grey heron, avocet, lapwing, ringed plover, curlew, bar-tailed godwit, turnstone, dunlin, snipe, redshank. | Species occurring in numbers >1% of Humber Estuary population. |
| North Killingholme Marshes Foreshore WeBS Sector (low-tide)[4]. | 2011 – 2012. | Black-tailed godwit. | Peak counts of 2,000 birds in August and September 2012. |
| | | Greylag goose, shelduck, mallard, teal, grey heron, little egret, cormorant, moorhen, oystercatcher, avocet, little ringed plover, curlew, redshank, black-headed gull, common tern. | Low numbers of these species recorded. |
| JBA Surveys of North Killingholme Marshes Foreshore. | September 2017 – May 2018 | Black-tailed godwit, lapwing, dunlin. | Most numerous species recorded, in numbers >500 birds. |
| | | Redshank, teal, shelduck, wigeon, curlew. | Recorded in numbers >100 birds. |
| ABP Monitoring Surveys North. Kilingholme Marshes Foreshore. | October 2018 – March 2019. | Black-tailed godwit, lapwing, teal. | Most numerous species recorded, in numbers >1,000 birds. |
| | | Avocet, dunlin, redshank. | Recorded in numbers >100 birds. |
| | October 2019 – March 2020. | Black-tailed godwit, lapwing. | Most numerous species recorded, in numbers >1,000 birds. |
| | | Teal, avocet, dunlin, redshank. | Recorded in numbers >100 birds. |
| Able UK Surveys North Killingholme Marshes Foreshore (Cutts and Hemingway). | December 2020 – March 2021. | Teal, lapwing, avocet. | Higher peak counts of these species than in previous surveys: teal (1,466), lapwing (980), avocet (205). |
| | | Black-tailed godwit. | Peak of 170 birds is lower than previous surveys (where numbers are usually into the 1,000s) however, survey period did not include August and September, which are typically when numbers of this species peak at North Killingholme Marshes Foreshore. |

[4] Surveys did not cover main wintering period which may explain lower numbers of some species when compared to other WeBS count datasets.

13.4.48 The North Killingholme Marshes Foreshore is a key location in the estuary for overwintering black-tailed godwit, with huge increases in the peak counts for this species in the Humber Estuary since the site was designated in the early 2000s. The bird count data indicate peak counts for this species at North Killingholme Marshes Foreshore regularly exceed 2,000 birds (in August/ September) with large aggregations roosting at high-tide in the nearby North Killingholme Haven Pits lagoons (close to Humber Sea Terminal).

13.4.49 The arable/ pasture fields inland between the estuary and Rosper Road (referred to as North Killingholme Marshes Fields) also provide feeding, roosting and loafing habitat for some SPA/ Ramsar site species, primarily curlew, with occasional usage by redshank, lapwing and other small wading birds. This area is considered functionally-linked land to the SPA/ Ramsar site due to the curlew peak counts being >1% of the Humber Estuary population (the threshold at which habitats are considered of importance to that species within the estuary context), although many of the fields are small and therefore less favoured by waterbirds.

13.4.50 The arable/pasture fields at North Killingholme Marshes Fields have generally seen a decline in bird numbers since the counts were originally undertaken for the AMEP scheme in the mid-2000s as they have been progressively taken out of agricultural management (and thus the sward height has increased) and become less suitable for waterbirds. The fields north of Station Road have all been permanently lost to development of the AMEP scheme, which commenced around six years ago, for which compensatory wet grassland habitat has been delivered at East Halton Skitter (north of Humber Sea Terminal).

### *Surveys for the Proposed Developments*

13.4.51 The following wintering bird surveys were undertaken for the Proposed Developments to inform the EcIA and HRA:

- monthly bird surveys (terrestrial) – two visits per month between October 2021 and March 2022 inclusive covering the period two hours either side of high-tide. Survey scope included the Sites, Rosper Road Pools and terrestrial fields to the east of Rosper Road that had the potential to be functionally-linked to the Humber Estuary SPA/ Ramsar site; and
- monthly bird surveys (coastal) - two visits per month between October 2021 and March 2022 inclusive covering the period two hours either side of high-tide of the section of North Killingholme Marshes (NKM) mudflats closest to the Proposed Developments.

13.4.52 The surveys cover a wide area, as illustrated on Figure 13.5 (ES Volume III) with fields/ compartments numbered as follows:

- Area 1 VPI Site.
- Area 2 Rosper Road Pools LWS.
- Areas 3-7 Fields adjacent to Rosper Road south of Marsh Lane.
- Areas 10-17 Fields adjacent to Rosper Road north of Marsh Lane.
- Area 18 Mosaic of habitats east of the railway bridge on Marsh Lane.
- Area 19 The Humber foreshore.

13.4.53 The Phase 1 Habitat Survey undertaken in June 2021 confirmed the VPI Site comprises a mosaic of brownfield land and grassland/ scrub; there is therefore no suitable habitat within the VPI Site boundary for feeding, roosting or loafing wintering/passage SPA/ Ramsar site bird species.

13.4.54 A summary of the survey results is presented in Table 13.13 below. Further details on the methods, result and detailed data analysis is provided in Appendix 13A (ES Volume II). Peak counts exceeding the 1% threshold for that species are highlighted in bold text.

## Table 13.13: Summary of wintering bird survey peak counts and analysis against Humber Estuary 1% threshold

| Species | Peak Counts | | | | | | | | | | | | | | | | Humber Estuary 1% Threshold |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VPI Site (Field 1) | Area 2 (Rosper Road Pools) | Field 3 | Field 5 | Field 6 | Field 7 | Field 8 | Field 9 | Field 10 | Field 13 | Field 14 | Field 15 | Field 16 | Field 17 | Area 18 | Area 19 (NKM Mudflats) | |
| Bar-tailed godwit | | **6** | | | | | | | | | | | | | | | 16 |
| Black-tailed godwit | | **480** | | | | | | 2 | 8 | | | | | | 1 | 35 | 45 |
| Curlew | | | 1 | 9 | **50** | 24 | | **35** | **74** | 15 | **38** | **35** | 3 | 2 | **79** | **108** | 28 |
| Dunlin | | | | | | | | | | | | | | | | **205** | 160 |
| Lapwing | 4 | 66 | | | | | | 2 | | | | 1 | | | 18 | **665** | 165 |
| Oystercatcher | | | | | | | | | | | | | | | | 2 | 58 |
| Pink-footed goose[5] | | | | | | | 1 | | | | | | | | | | 143 |
| Redshank | | 8 | | | | | | | | | | | | | **40** | **69** | 29 |
| Shelduck | | 12 | | | | | | | | | | | | | | 28 | 45 |
| Wigeon | | **126** | | | | 4 | | | | | | | | | | 2 | 27 |

[5] Although not a qualifying species for the Humber Estuary SPA/ Ramsar site, this species has been included on the basis that Natural England now consider pink-footed goose to be part of the SPA/ Ramsar site designated assemblage due to the increases in numbers in this area

### *Wintering Birds within the VPI Site*

13.4.55 No SPA/ Ramsar site/ SSSI birds were recorded using Area 1 (the VPI Site) during the winter 2021/ 2022 surveys and the habitats present are generally unsuitable for such use. The VPI Site is therefore not considered functionally-linked to the Humber SPA and no further consideration is given to the use of the Site by SPA/ Ramsar site birds in this assessment.

13.4.56 Sparrowhawk, buzzard and peregrine falcon were all recorded hunting over the VPI Site during the winter survey period and snipe were seen on a regular basis. The VPI Site is evaluated as being important at a **Site** level for its winter bird assemblage.

### *Wintering Birds within Adjacent Terrestrial Fields (East of Rosper Road)*

13.4.57 Curlew was recorded in the terrestrial fields surveyed in numbers regularly exceeding 1% of the Humber Estuary threshold; this reaffirms the findings of many other surveys conducted in these fields in recent years. In all cases, use of the fields by curlew was sporadic, although the surveys are only a snapshot of the usage across the high-tide period and there are likely to be many factors influencing the use of the fields by this species across the passage and wintering period (e.g., localised disturbance, sward height etc.). It is evaluated that the fields are functionally-linked to the Humber Estuary SPA/ Ramsar site due to their supporting role in providing feeding, roosting and loafing habitat for curlew across the high-tide period. Curlew were recorded in most of the fields surveyed on the east side of Rosper Road, although the smaller fields (3, 4, 11 and 12) were either used by only small numbers or avoided altogether by curlew.

13.4.58 Redshank was recorded on one visit within the terrestrial fields surveyed (Area 18, a group of fields/ land within the tank farms adjacent to the estuary) with that visit recording a peak count of 40, which is >1% Humber Estuary threshold for this species. The species was regularly recorded on the North Killingholme Marshes mudflats across the survey period, although does not appear to favour the adjacent terrestrial fields for feeding, roosting and loafing.

13.4.59 Very small numbers of other SPA/ Ramsar site species were recorded in the fields across the survey period; there were occasional single-figure records of black-tailed godwit, oystercatcher and wigeon. The fields are therefore providing a supporting habitat to the estuary for these species but as they are present in such low numbers, which are well below the 1% thresholds for each species, it is concluded that the fields are not providing functionally-linked land for these species.

13.4.60 Rosper Road Pools (Area 2) was recorded to support good numbers of black-tailed godwit with several of the monthly counts recording numbers >1% Humber Estuary threshold. Rosper Road Pools also supported good numbers of lapwing, redshank and shelduck (although all counts were <1% Humber Estuary thresholds for these species), as well as wigeon (regular counts >1% Humber Estuary threshold). It is evaluated that this habitat is of importance in supporting the adjacent mudflats as a feeding, loafing and roosting resource for black-tailed godwit and wigeon and is therefore functionally-linked land to the SPA/ Ramsar site.

13.4.61 Surveys of the nearest section of the mudflats at North Killingholme Marshes were undertaken; this survey area coincides with the lower end of WeBS Core Count Killingholme Marshes Sector J. Very few black-tailed godwits were recorded; this is perhaps surprising given that this area is known to be a key foraging resource for this species in the Humber Estuary however, as the surveys were undertaken over the high-tide period, this would be expected to coincide with the period when black-tailed godwit are roosting elsewhere. Other species recorded at North Killingholme Marshes mudflats also reaffirmed the results of previous survey work, with curlew, lapwing and dunlin present in numbers >1% threshold.

13.4.62 The surveys undertaken for the Proposed Developments reaffirmed the findings of previous surveys in this part of the estuary, with the terrestrial fields supporting numbers of curlew regularly exceeding 1% of the Humber Estuary threshold indicating their importance within the estuary and thus confirming they are functionally-linked to SPA/ Ramsar site. Although some of the fields are small (e.g., Fields 4, 11 and 12) and therefore not favoured by curlew (due to their enclosed nature they do not provide sufficient scanning distances for predators),

the overall complex of fields within this part of North Killingholme is clearly providing high-tide roosting, loafing and feeding habitat for curlew and can be considered functionally-linked land to the SPA/ Ramsar site.

13.4.63 Redshank was the only other species recorded in terrestrial habitats in numbers above the 1% Humber Estuary threshold for the species; this was in Area 18, which incorporated all the habitats around the tank farm immediately adjacent to the mudflats. The Rosper Road fields are clearly not regularly used by redshank or any other SPA/ Ramsar site species in numbers that would be considered important within the Humber Estuary context.

13.4.64 Most of the terrestrial fields east of Rosper Road supported only small numbers of wintering and passage SPA/ Ramsar site birds, likely due to the relatively small and enclosed nature of the fields, which are not favoured by feeding, roosting or loafing birds because they do not offer sufficient visual scanning distances for birds to observe approaching ground-based predators.

13.4.65 Of the fields closest to the VPI Site:

- Field 3 supported curlew on 1 survey visit (peak count of 1 bird);
- Field 5 supported curlew on 2 survey visits with peak counts <10 birds on both occasions and no other SPA/ Ramsar site birds recorded;
- Field 10 supported numbers of curlew >1% threshold on 2 of 3 surveys this species, lapwing was recorded on 1 survey visit (peak count of 2 birds) and black-tailed godwit recorded on 1 visit (peak count of 2 birds); and
- Fields 11 and 12; no SPA/ Ramsar site birds were recorded during the surveys.

13.4.66 Surveys confirmed Rosper Road Pools provides high-tide roosting and loafing habitat for black-tailed godwit, supporting the conclusion that this part of the estuary is a stronghold for this species with the habitats provided by the intertidal mudflats at North Killingholme Marshes, supported by terrestrial habitats close by including Rosper Road Pools and Killingholme Pits SSSI, which is known to be favoured roost site for black-tailed godwit. The SSSI is approximately 2.7 km north of Rosper Road Pools.

13.4.67 Fields adjacent to the VPI Site (east of Rosper Road), including Rosper Road Pools LWS, are considered functionally-linked land to the Humber Estuary SPA/ Ramsar site and are evaluated to be of **Regional** importance to nature conservation.

### Bats

13.4.68 The desk study produced 37 records for four species of bats between 2009 and 2018, including one roost record for common pipistrelle in South Killingholme 1.8 km south-west of the VPI Site. There is also a record of a noctule maternity roost in Burkinshaw's Covert approximately 900 m north-west of the VPI Site (Alan Jones, *pers. comm*. Conservation Officer, Humber Nature Partnership).

13.4.69 The VPI Site provides no roosting opportunities for bats and limited foraging opportunities. Bat activity was very low and on many nights, less than 10 bat passes were recorded all night. Activity levels were marginally greater in the edge habitat along the railway tree-line than in the open grassland.

13.4.70 The static ultrasound surveys revealed the VPI Site is used by common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle and noctule bat. Bats of the *Myotis* genus were grouped due to call convergence but the majority of those recorded close to water are likely Daubenton's bat due to the known foraging behaviour of this species.

13.4.71 Common pipistrelles are the most common and widespread bat species in the UK and are likely to be the most frequently encountered species; their presence can be expected in the majority habitat types.

13.4.72 Soprano pipistrelles are also a common and widespread S41 species with a greater preference for woodland and water habitats compared to common pipistrelles.

13.4.73 Nathusius' pipistrelle is a scarce but widespread species in the UK with an easterly bias and is a known long-distance, intercontinental migrant. UK records tend to increase in autumn hence perhaps why low numbers of passes were recorded in September and not earlier in the summer.

13.4.74 Noctule bats are a high-flying open-habitat S41 species. Some of the calls recorded during the survey are likely to be from bats commuting over the VPI Site but the open grassland and scrub areas also provide foraging opportunities. The times of the calls were often close to sunset and sunrise, suggesting that the bats are roosting locally and are perhaps from the maternity colony in Burkinshaw's Covert.

13.4.75 Bats are highly mobile species and the VPI Site is relatively small with no habitats that are markedly more suitable than those in the wider landscape. Given that the woodland belt along the railway is to be retained, bats are likely to be resilient to the impacts of the Proposed Development and as such, no further consideration is given to them in this assessment, although measures to ensure legal compliance are set out in the Outline CEMP in Appendix 4A in ES Volume II.

### Badgers

13.4.76 The desk study provided a number of badger records, the nearest being in 2017 (location not revealed) 1.1 km from the VPI Site. In 2022, ESL recorded a badger on a camera trap located approximately 1.4 km south-west of the VPI Site. In both cases, the locations have not been disclosed in this report for confidentiality reasons due to the sensitivity of the species protection however, neither record is germane to this assessment.

13.4.77 No badgers were recorded during surveys to inform the adjacent VPI OCGT application in 2018.

13.4.78 No evidence of badgers was found on or adjacent to the VPI Site during surveys in 2022 to inform the current assessment.

13.4.79 Whilst the VPI Site south of South Killingholme Drain has habitats that are suitable for use by foraging badgers, opportunities to excavate setts are very limited due to the flat topography. Badgers are therefore presumed to not make use of the VPI Site and as such, no further consideration is given to them in this assessment.

### Water Voles

13.4.80 The desk study provided a number of water vole records, the most germane being 11 records from 2004 to 2009 for Rosper Road Pools, approximately 130 m east of the VPI Site.

13.4.81 The only watercourse within the VPI Site is South Killingholme Drain. The drain was surveyed from within the channel all the way through the VPI Site downstream, beneath Rosper Road, to its discharge point into Rosper Road Pools. No evidence of current use by water voles was recorded.

13.4.82 In addition, the roadside ditch along the west side of Rosper Road was surveyed from within the channel from its connection with the IDB drain in the south at TA 17126 17011, 200 m north (upstream) to an existing outfall from the VPI facility at TA 17018 17180. Again, no evidence of current use by water voles was recorded.

13.4.83 Water voles can be a cryptic species and their populations can increase and decrease rapidly. Whilst no water voles were found during the surveys in 2022, the habitats on and adjacent to the VPI Site remain suitable and the desk study records are relatively recent. Rosper Road Pools covers a large area and the wide, dense reedbeds that border the pools could sustain a core population that in boom years could expand into the connecting drain network and potentially into the VPI Site.

13.4.84 Water voles are not considered further in this assessment although pre-commencement surveys will be undertaken to reappraise their status. Measures to ensure legal compliance are set out in the Outline CEMP in Appendix 4A in ES Volume II.

### Otters

13.4.85 The desk study provided 10 otter records, from 1975 to 2020, most from either Halton Marsh Clay Pits or Killingholme Haven Pits, located 4.4 km and 2.7 km north-east of the VPI Site respectively.

13.4.86 No evidence of current use by otters was recorded in any watercourse during the water vole survey.

13.4.87 Away from the coast, otters are a cryptic, nocturnal species with large home ranges. The records of otter in large waterbodies next the Humber Estuary probably reflect the availability of fish and eels. There are no opportunities for holts on the VPI Site or the roadside ditch along Rosper Road and neither provides meaningful habitat connectivity. Rosper Road Pools and its associated drain network suffer far less disturbance an have better overall habitat connectivity for otters but are sufficiently distant from any effects of the Proposed Development. No further consideration is given to otters in this assessment.

## *Summary of Important Ecological Features of the VPI Site*

13.4.88 The important ecological features of the VPI Site are set out in Table 13.14, together with the geographical context over which they are considered important. Features considered important at a less than Local level are not carried forward to the assessment stage as they are unlikely to be subject to effects that would constitute a material consideration in determining the application however, many will benefit from habitat creation and enhancement measures undertaken for other species.

**Table 13.14: Summary of important ecological features of the VPI Site**

| Important Feature | Geographic Context | Justification |
|---|---|---|
| Humber Estuary EMS | International importance | Conservation status |
| Killingholme Haven Pits SSSI | National importance | Conservation status |
| Rosper Road Pools LWS | County importance | Potential for direct effects on habitats due to changes in water quality. |
| Grassland (as habitat for S41 species only) | County Importance | Supports S41 butterfly and S41 bird species. Habitat lost due to the Proposed VPI Development. |
| Open Mosaic Habitats on Previously Developed Land (OMH) | Local importance | S41 habitat. Large area of habitat lost due to the Proposed VPI Development. |
| Invertebrates (small heath only) | County Importance | Small heath butterfly is a S41 species in severe decline. Habitat lost due to the Proposed VPI Development. |
| Breeding bird assemblage | Local importance | Site supports a Schedule-1 species and seven S41 species. Habitats lost due to the Proposed VPI Development. |
| Winter bird assemblage (adjacent habitats) | Regional importance | Fields support numbers of SPA/ Ramsar site waterbirds >1% Humber Estuary population thresholds and are considered functionally-linked land to the SPA/ Ramsar site.<br>Potential for noise/ visual disturbance during construction due to the Proposed VPI Development |

| Important Feature | Geographic Context | Justification |
|---|---|---|
| Winter bird assemblage (Site) | Site importance | Foraging opportunities by a range of raptors. Habitats lost due to the Proposed VPI Development |
| Bat assemblage | Local Importance | Likely to be resilient to any adverse effects. Precautionary measures required to ensure legal compliance. |

## Future Baseline (No Development in 2023)

### Phillips 66 Site

13.4.89 It is reasonable to assume the operational areas of the Phillips 66 Site will continue to be managed as they are at present, i.e., cut/ sprayed-off when they begin to look untidy.

13.4.90 It is assumed the hedgerow along Eastfield Road will be managed on the grounds of health and safety to ensure that it does not impede traffic, as will the trees along the railway. On balance, no material changes are anticipated to occur on the Phillips 66 Site in the Future Baseline.

### VPI Site

13.4.91 In the continued absence of habitat management, the proportion of scrub and self-set saplings can be expected to increase to the detriment of open grassland areas, with the grassland becoming gradually less diverse. Over a longer period, this gradual habitat succession is likely to result in a change to the breeding bird assemblage, although such a change is unlikely to be substantive in the short time frame under consideration.

13.4.92 Areas of OMH currently dominated by bare ground can be expected to vegetate, over time, potentially elevating this habitat from Local to County level importance for nature conservation.

13.4.93 It is assumed the IDB will continue to manage South Killingholme Drain, although this appears to be limited to cutting the grass on the access track that runs parallel, rather than any management of the channel.

13.4.94 Water voles could feasibly colonise South Killingholme Drain and could therefore form part of the Future Baseline.

# 13.5 Development Design and Impact Avoidance

13.5.1 Measures to avoid or minimise ecological effects have been considered at various stages of the Proposed Developments' design in accordance with the mitigation hierarchy. These measures are described below for both the construction and operational phases.

13.5.2 In most cases the measures are applicable to both the Proposed Phillips 66 Development and the Proposed VPI Development. Where a bespoke measure applies to one of the Proposed Developments and not the other, this is specified.

13.5.3 The assessment of impacts and effects in the following section takes account of these measures already being in place.

## Construction Phase

13.5.4 The construction phase of each of the Proposed Developments will comply with industry good practice and environmental protection legislation in relation to the prevention of surface and ground water pollution, dust management, noise prevention and artificial light pollution. Full details of these measures and how they will be implemented to ensure legal compliance will be set out in a Construction Environmental Management Plan (CEMP) (see the Outline CEMP in Appendix 4A in ES Volume II).

13.5.5 The clearance of all vegetation suitable for use by nesting birds will be undertaken outside the breeding season, typically early March to mid-August inclusive for most species. Where this is not possible, the area would be searched for active nests by an ecologist in advance of the works. Any active nests (those being built, or with eggs or young) would be cordoned off and protected until the young have fledged.

13.5.6 A water vole survey will be undertaken of any suitable watercourse prior to partial culverting, diversion work or any work affecting the bank face or channel (associated with the Proposed VPI Development). If the section of drain to be impacted is less than 50 m in length, then any water voles present can be displaced under a Class Licence but only during the period 15 February to 15 April. Any work affecting water voles outside this period would require derogation under a project licence to allow translocation.

13.5.7 Excavations will be covered overnight or will have a batter or scaffold board at one end to provide a means of escape for any animal that might fall in.

13.5.8 Features suitable for use by roosting bats can appear relatively quicky, for example, as a result of disused woodpecker nest holes and storm damage. Any trees subject to felling will therefore be inspected for potential roost features in advance of work by an ecologist with a Natural England bat licence.

13.5.9 Temporary lighting will be managed so as to avoid unnecessary light spill onto sensitive habitats, in particular the tree-lined railway corridor.

## Operation Phase

13.5.10 Light spill will be minimised as far as possible, for example by directing lighting away from sensitive habitats in accordance with best practice.

13.5.11 Surface water discharge will be attenuated to green-field run-off rates and potentially contaminated water/foul drainage will be treated. There will therefore be no significant changes in the water quality, flow rate or water volumes within the drainage network that is connected to Rosper Road Pools LWS.

## Decommissioning Phase

13.5.12 Further site surveys will 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.

13.5.13 The following measures will be implemented as appropriate:

- survey findings and associated mitigation requirements will be discussed and agreed with stakeholders as required prior to the start of works;
- relevant stand-off working distances will 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 will be achieved (if water voles are present);
- all necessary protected species licences will be obtained to derogate unavoidable impacts on relevant protected species. Mitigation and monitoring will be implemented in accordance with the requirements of the relevant licences;
- works will be planned to avoid key risk periods (seasons) where appropriate and practicable; and
- relevant works will be undertaken under the supervision of an Ecological Clerk of Works to deliver compliance with relevant legislation and approved mitigation.

# 13.6 Likely Impact and Effects of the Proposed Developments

13.6.1 This section identifies the likely impacts and effects resulting from each Proposed Development, as well as the cumulative likely impacts and effects. The effects are determined in accordance with the identified methodology.

13.6.2 The assessments of any effects are made in the absence of any mitigation measures that are not embedded in the project design. Where an effect requiring additional mitigation is identified, it is carried forward into the next section.

13.6.3 With the exception of a small area of overlap along the tree-lined railway during the construction phase (which is described in each scheme), the two Proposed Developments can be carried out independent of each other so, to the impacts and effects are described separately below.

## Phillips 66 Site

### Construction Phase

#### *Effects on Designated Sites*

##### Humber Estuary SAC/ SPA/ Ramsar Site/ SSSI

##### *Noise/ Visual Disturbance to Breeding SPA/ Ramsar Site/ SSSI Birds*

13.6.4 There is no suitable breeding habitat within the Phillips 66 Site for the qualifying breeding species of the SPA/ Ramsar site/ SSSI, which are bittern, marsh harrier, little tern and avocet.

13.6.5 Breeding avocet are known to be present on Rosper Road Pools LWS, which is approximately 500 m east of the Phillips 66 Site however, the existing infrastructure within the Humber Refinery and the adjacent VPI Immingham CHP Plant, as well as Rosper Road, lie between the Proposed Phillips 66 Development and Rosper Road Pools; it is therefore reasonable to conclude there is no potential for visual disturbance to birds using Rosper Road Pools during construction.

13.6.6 The nature and scale of the temporary construction activities associated with the Proposed Phillips 66 Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This includes temporary construction activities in the AMEP DCO site to the northeast and the structures associated with the existing VPI Immingham CHP Plant to the east of the Proposed Phillips 66 Development. It is envisaged that the plant, machinery, vehicles and structures used during construction will not result in any material change in the conditions currently surrounding the Rosper Road Pools.

13.6.7 Noise modelling has been undertaken as a precaution and is presented in Chapter 7 (Noise and Vibration, ES Volume I). The modelled noise levels at the nearest part of Rosper Road Pools are in the 60–65 dB LAeq,T range and <60 dB LAeq,T across the open lagoon habitat. The predicted maximum noise level arising from construction activities on the nearest part of the Proposed Phillips 66 Development to Rosper Road Pools is <60 dB LAmax across the whole of Rosper Road Pools. Studies indicate that noise levels >84 dBA typically elicit a flight response in birds and the same research recommends that construction noise levels be kept below 70 dB to avoid excessive disturbance of birds. Given that the modelled levels are well below 70 dB LAeq,T/LAmax, it is therefore concluded nesting avocet and wintering/ passage waterbirds at Rosper Road Pools would not be disturbed. This is assessed as a **negligible** effect (**non-significant**).

##### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds within SPA/ Ramsar Site/ SSSI*

13.6.8 The Proposed Phillips 66 Development is approximately 1.7 km inland from the nearest intertidal mudflats at North Killingholme Marshes Foreshore. At this distance, it is reasonable to conclude there is no potential for direct noise or visual disturbance to waterbirds feeding,

roosting and loafing on the mudflats as a result of construction activities. This is assessed as a **negligible** effect **(non-significant**).

### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds using Functionally-linked Land*

13.6.9 The Proposed Phillips 66 Development is approximately 500 m from the nearest fields used occasionally by numbers of curlew >1% Humber Estuary population threshold and which are considered functionally-linked land. The Proposed Phillips 66 Development is physically separated from these fields by the existing Humber Refinery (and associated operations), as well as the existing VPI Immingham CHP Plant, which is on the opposite side of Rosper Road to the fields.

13.6.10 As discussed above in respect of potential disturbance to Rosper Road Pools, the nature and scale of the temporary construction activities associated with the Proposed Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This includes temporary construction activities in the AMEP DCO site to the northeast and the structures associated with the existing VPI CHP Plant to the west of the Proposed Development. It is envisaged that the plant, machinery, vehicles and structures used during construction will not result in any material change in the conditions currently surrounding the Rosper Road Pools.

13.6.11 Noise modelling has been undertaken and is presented in Chapter 6 (Noise and Vibration, ES Volume I). The modelled noise levels at the nearest functionally-linked field (Field 5) to the Proposed Development are in the 60–65dB LAeq,T range and <60dB LAeq,T across the majority of the field. Studies indicate that noise levels >84dBA typically elicit a flight response in birds and the same research recommends that construction noise levels be kept below 70dB to avoid excessive disturbance of birds. Given that the modelled levels are well below 70dB LAeq,T/LAmax, it is therefore concluded that wintering/passage waterbirds using terrestrial fields east of Rosper Road would not be disturbed during the construction phase of the Proposed Development. This is assessed as a negligible effect (non-significant).

13.6.12 In terms of visual impacts, the nature and scale of the temporary construction activities associated with the Proposed Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road fields. This includes temporary construction activities in the AMEP DCO site to the northeast and the structures associated with the existing VPI CHP Plant to the immediate east of the Proposed Phillips 66 Development. It is envisaged that the plant, machinery, vehicles and structures used during construction will not result in any material change in the conditions currently surrounding the Rosper Road fields. The hedgerows/ scattered trees along the eastern side of Rosper Road also provide some visual screening of traffic/ plant movement along Rosper Road and within the construction site. This is assessed as a **negligible** effect (**non-significant**).

### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds using AMEP Mitigation Land*

13.6.13 The Proposed Phillips 66 Development is approximately 800 m south-west of the consented AMEP ‘Mitigation Area A’ land, which is on the eastern side of Rosper Road directly opposite the existing VPI Immingham CHP Plant. This habitat was included within the AMEP DCO to mitigate extensive losses of functionally-linked land supporting overwintering/passage waterbirds in numbers >1% of the Humber Estuary populations within the footprint of the AMEP development however, this mitigation area was subsequently been permitted to relocated to the Halton Marshes Wet Grassland Mitigation Area in a non-material change to the DCO. The former Mitigation Area A land will now be subject to further development associated with the AMEP scheme as part of a material amendment to the DCO. The Halton Marshes Wet Grassland Mitigation Area, which is north of Able UK’s Humber Sea Terminal, has already been created. This habitat is approximately 4.7 km north of the Proposed Phillips 66 Development and therefore well outside the zone of influence of any noise/ visual disturbance associated with the Proposed Phillips 66 Development. This potential impact pathway is therefore scoped out.

### *Underwater Noise Disturbance to SAC/ Ramsar Site Marine Mammals and Fish*

13.6.14 All construction works for the Proposed Phillips 66 Development are >1 km from the estuary and over this distance, it is reasonable to conclude that there would be no propagation of underwater noise that could significantly affected the qualifying features.

### *Dust Smothering of Designated Habitats*

13.6.15 Given the distance of the designated habitats from the Proposed Phillips 66 Development (approximately 1.7 km), they are well outside the zone of influence of fugitive dust emissions from construction, which is approximately 50 m. There is therefore no potential for dust smothering of designated habitats.

### *Changes in Air Quality due to Construction Vehicle Road Traffic Movements*

13.6.16 The Humber Estuary SAC/ Ramsar is >200m from the affected road network and therefore in accordance with IAQM guidance, there is no requirement for an air quality assessment to be undertaken for construction road traffic movements. This pathway is therefore scoped out of the impact assessment.

### *Changes in Surface Water Quality due to Pollution/ Siltation*

13.6.17 There is the potential for pollution/ siltation of Humber Estuary via the surface water drainage network, into which surface-water run-off from the Proposed Philips 66 Development will outfall during construction however, the existing Humber Refinery surface water drainage systems and standard environmental measures to control pollution to the drains during the construction phase will adequately minimise risk; this is required for compliance with environmental legislation. It is therefore concluded that with the embedded measures to control pollution/ siltation during construction, there will be a **negligible** (non-significant) effect on the Humber Estuary SAC/ SPA/ Ramsar site habitats and the species they support.

## North Killingholme Haven Pits SSSI

13.6.18 There will be no direct effects on North Killingholme Haven Pits SSSI. VPI Immingham CHP Plant, Lindsey Oil Refinery (LOR) and Able UK Humber Port all lie between the Phillips 66 Site and the SSSI. As the SSSI is over 2 km from the Proposed Phillips Development, it is reasonable to conclude that there is no potential for noise/ visual disturbance to waterbirds using the SSSI as a result of construction activities.

## Rosper Road Pools LWS

### *Noise/ Visual Disturbance to Breeding and Wintering Birds*

13.6.19 This potential impact has been assessed in respect of potential for impacts on breeding and wintering waterbirds using land functionally-linked to the Humber Estuary SPA/ Ramsar site/ SSSI within Rosper Road Pools LWS; it was concluded to result in a **negligible** effect (**non-significant**).

### *Changes in Surface Water Quality due to Pollution/ Siltation*

13.6.20 The pools within the LWS are used for flood storage (the site is managed for flood attenuation by the IDB). There is therefore potential for pollution/ siltation of Rosper Road Pools via the surface water drainage network, into which surface-water run-off from the Proposed Phillips 66 Development will outfall during construction. The hydrological connectivity between South Killingholme Drain (the main channel drainage for the Site) is identified in Chapter 9 (Water and Flood Risk) however, the existing Humber Refinery surface water drainage systems and standard environmental measures to control pollution to the drains during construction phase will adequately minimise risk, as is required for compliance with environmental legislation. It is therefore concluded that with the embedded measures to control pollution/ siltation during construction, there will be **negligible** (**non-significant**) effect on the Rosper Road Pools LWS and the species it supports.

### *Changes in Air Quality due to Construction Vehicle Road Traffic Movements*

13.6.21 The worst case Annual Average Daily Traffic (AADT) flow associated with the construction phase of the Proposed Phillips 66 Development results in a change in the number of Light Duty Vehicles (LDV, all vehicles less than 3.5 tonnes gross weight) and Heavy Duty Vehicles (HDV, greater than 3.5 tonnes gross weight) in excess of the IAQM threshold. This threshold identifies the level at which significant changes in air quality may occur (a change of 500 LDV or 100 HDV when outside of an Air Quality Management Area), and therefore an air quality impact assessment of construction traffic movements has been undertaken (see Chapter 6: Air Quality, ES Volume I).

13.6.22 As Rosper Road Pools LWS is within 200m of the affected road network it has been scoped into the modelling, which considers the worst-case scenario for construction vehicle emissions at the receptor (referred to in Chapter 6: Air Quality as CTE2). Although Rosper Road Pools LWS comprises primarily open water habitats that are not susceptible to the effects of nitrogen deposition, the presence of broad-leaved woodland is identified in the citation, although this relates only to the mature hedgerows and mature scrub surrounding the pools rather than it being purely woodland habitat. A precautionary approach to the air quality assessment has therefore been undertaken.

13.6.23 The air quality assessment has modelled a peak construction activity scenario for the Proposed Phillips 66 Development, as this represents a peak of vehicle movements on the local road network, inclusive of construction traffic from the Proposed VPI Development at the time. Peak construction activity for the Proposed VPI Development alone has not been modelled, as this would not represent a peak of construction vehicle movements.

13.6.24 Two scenarios have been modelled in the construction traffic air quality impact assessment (see Chapter 6: Air Quality, Appendix 6A, ES Volume II) and these are summarised below:

- Do Something (DS) Scenario 1 - Baseline traffic for the year 2025 + traffic associated with Peak Construction Vehicle Movements, which occurs for the Phillips 66 Proposed Development (Month 23); and
- DS Scenario 2 - Baseline traffic for the year 2025 + traffic associated with Peak HGV Movements (Month 27).

13.6.25 This pathway has therefore been considered in the cumulative effects assessment section, as there is no air quality impact assessment for construction traffic for the Proposed Phillips 66 Development alone (or the Proposed VPI Development alone).

### Eastfield Road Railway Embankment LWS

13.6.26 East Field Road Railway Embankment LWS is approximately 120 m north-west of the Proposed Phillips 66 Development however, there is no potential for any direct impacts on the LWS as it is physically separated from the Proposed Phillips 66 Development by Eastfield Road.

13.6.27 This site is scoped into the cumulative air quality impact assessment as it is within 200m of the affected road network (see Chapter 6: Air Quality, ES Volume I). The site has been assessed against criteria for neutral grassland.

### Eastfield Road Pit LWS

13.6.28 This site is scoped into the air quality impact assessment as it is within 200m of the affected road network (see Chapter 6: Air Quality, ES Volume I). The site has been assessed against criteria for neutral grassland.

### Other Local Wildlife Sites.

13.6.29 Burkinshaw's Covert and Mayflower Wood Meadow LWS were identified in the desk study as potentially within the zone of influence of the Proposed Phillips 66 Development however, both are sufficiently distant from the Phillips 66 Site (almost 1 km away) and are buffered by industrial land use. Both are designated primarily for the habitats they support and the Proposed Phillips 66 Development will not have any direct impacts on these habitats.

### *Loss of Hedgerows*

13.6.30 A short section of hedgerow along Eastfield Road will be removed in order to create a new highway access for the Proposed Phillips 66 Development. This will result in permanent and irreversible loss of an S41 habitat and a small loss of nesting bird habitat, although the effect is likely to be negligible in magnitude given that this hedgerow is over 340 m long. The effect is assessed as being **minor adverse** (**non-significant**).

### *Loss of Trees/ Scrub*

13.6.31 The Proposed Phillips 66 Development carbon dioxide ($CO_2$) pipeline and cables will traverse the existing railway using the existing overhead pipe bridge and then be routed above ground towards the south-east to a connection with a $CO_2$-gathering network (to be provided by others). This will require some facilitation pruning and/ or removal of scrub. The area affected is likely to be small but will result in a minor loss of nesting habitat for some bird species. The effect is assessed as being **minor adverse** (**non-significant**).

## Operation Phase

### *Effects on Designated Sites*

#### Humber Estuary SAC/ SPA/ Ramsar Site/ SSSI

##### *Noise/ Visual Disturbance to Breeding SPA/ Ramsar Site/ SSSI Birds*

13.6.32 The Proposed Phillips 66 Development is approximately 1.7 km inland from the nearest intertidal mudflats at North Killingholme Marshes Foreshore. At this distance it is reasonable to conclude there is no potential for direct noise or visual disturbance to waterbirds feeding, roosting and loafing on the mudflats as a result of operational activities.

13.6.33 Breeding avocet are known to be present on Rosper Road Pools LWS, which is approximately 500 m east of the Proposed Phillips 66 Development however, the existing infrastructure within the operational Humber Refinery and the adjacent VPI Immingham CHP Plant, as well as Rosper Road, lie between the Proposed Phillips 66 Development and Rosper Road Pools; it is therefore reasonable to conclude there is no potential for visual disturbance to birds using Rosper Road Pools during operation.

13.6.34 The nature and scale of the operational activities associated with the Proposed Phillips 66 Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This includes the operation of the existing VPI Immingham CHP Plant to the west of the Proposed Phillips 66 Development, the Lindsey Oil Refinery to the west and ongoing construction activities within the consented AMEP development area to the north. It is envisaged that the plant, machinery, vehicles and structures used during operation will not result in any material change in the conditions currently surrounding the Rosper Road Pools.

13.6.35 Noise modelling has been undertaken and is presented in Chapter 6 (Noise and Vibration, ES Volume I). The modelled noise levels at the nearest part of Rosper Road Pools are <60 dB LAeq,T across the open lagoon habitat. As discussed in respect of operational noise, studies indicate that noise levels >84 dBA typically elicit a flight response in birds and the same research recommends that construction noise levels be kept below 70 dB to avoid excessive disturbance of birds. Given that the modelled operational noise levels are well below 70 dB LAeq,T/ LAmax, it is therefore concluded that nesting avocet at Rosper Road Pools would not be disturbed.

##### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds within SPA/ Ramsar Site/ SSSI*

13.6.36 The Proposed Phillips 66 Development is approximately 1.7 km inland from the nearest intertidal mudflats at North Killingholme Marshes Foreshore. At this distance it is reasonable to conclude there is no potential for direct noise or visual disturbance to waterbirds feeding, roosting and loafing on the mudflats as a result of operational activities. This is assessed as a **negligible** effect (**non-significant**).

### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds using Functionally-linked Land*

13.6.37 Noise modelling has been undertaken and is presented in Chapter 6 (Noise and Vibration). The modelled noise levels at the nearest functionally-linked land associated with Rosper Road Fields (Field 5) are <60 dB LAeq,T across the habitat. As discussed in respect of construction noise, studies indicate that noise levels >84 dBA typically elicit a flight response in birds and the same research recommends that construction noise levels be kept below 70 dB to avoid excessive disturbance of birds. Given that the modelled operational noise levels are well below 70 dB LAeq,T/ LAmax, it is therefore concluded that nesting avocet at Rosper Road Pools would not be disturbed.

13.6.38 In terms of visual impacts, the nature and scale of the temporary construction activities associated with the Proposed Phillips 66 Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road fields. This includes temporary construction activities in the AMEP DCO site to the north-east, the structures associated with the existing VPI Immingham CHP Plant to the east of the Proposed Phillips 66 Development and the Lindsey Oil Refinery to the north-west. It is envisaged that the plant, machinery, vehicles and structures present during operation will not result in any material change in the conditions currently surrounding the Rosper Road fields. The hedgerows/ scattered trees along the eastern side of Rosper Road also provide some visual screening of traffic/plant movement along Rosper Road and within the operational site.

13.6.39 It is reasonable to assume that any SPA/ Ramsar site waterbirds roosting, loafing and/ or foraging in fields on the west side of Rosper Road are habituated to the general industrial nature (and its associated noise and visual impact from vehicle traffic, sirens, railway operations, chimney stacks, pipe racks, buildings etc.) of the surrounding area. This is assessed as a **negligible** effect (**non-significant**).

### *Changes in Air Quality due to Operational Emissions*

13.6.40 Intertidal habitats are not susceptible to the effects of changes in air quality arising from stack emissions during operation (increased nitrogen, ammonia and acid deposition) because of their regular tidal inundation. Subtidal habitats have similarly been scoped out.

13.6.41 Air quality modelling has been undertaken for operational emissions from the Proposed Phillips 66 Development and is presented in ES Chapter 6 (Air Quality, ES Volume I). The impact of emissions on sensitive ecological receptors are quantified in two ways:

- direct impacts: due to increases in atmospheric pollutant concentrations, which are assessed against defined 'critical levels'; and
- indirect impacts: deposition of acids and nutrient nitrogen to the ground surface, which are assessed against defined 'critical loads'.

13.6.42 The critical levels for the protection of vegetation and ecosystems are defined as "*concentrations of pollutants in the atmosphere above which direct adverse effects on... plants [and] ecosystems...may occur according to present knowledge*" and critical loads are defined as "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*" (Centre for Ecology and Hydrology (CEH) and Air Pollution Information System (APIS) website (2022). Critical levels and loads are set out in detail in Section 6.2 of ES Chapter 6 (Air Quality, ES Volume I).

13.6.43 The air quality assessment has considered the modelled effects of nitrogen dioxide $NO_2$ (annual mean/ daily mean), sulphur dioxide $SO_2$ (annual mean) and ammonia $NH_3$ (annual mean) emissions from the Proposed Phillips 66 Development on the worst impacted designated site receptor. All impacts are considered insignificant at the ecological receptors as they do not exceed the 1% screening threshold for Process Contributions (PC). For $NO_2$ (annual mean and daily mean) and $SO_2$ (annual mean), the PC is negative, i.e., represents a reduction in emissions for these two pollutants. It is therefore concluded that the Proposed Phillips 66 Development will result in a **negligible** (**non-significant**) effect on the Humber Estuary SAC/ SPA/ Ramsar site habitats as a result of changes in air quality due to operational stack emissions.

### *Changes in Air Quality due to Operational Vehicle Road Traffic Movements*

13.6.44 The Humber Estuary SAC/ Ramsar is >200m from the affected road network and therefore in accordance with IAQM guidance, there is no requirement for an air quality assessment to be undertaken for operational road traffic movements. This pathway is therefore scoped out of the impact assessment.

### *Changes in Surface Water Quality due to Effluent Discharge*

13.6.45 There is the potential for pollution of the Humber Estuary via the surface water drainage network, into which surface-water run-off from the Proposed Phillips 66 Development will outfall during operation. Standard environmental measures to control most potential contaminants to the drains during operation will adequately minimise risk; the majority of wastewater will be routed through the existing refinery Effluent Treatment Plant (ETP) before being routed to a holding pond prior to discharge into South Killingholme Drain. However, the Wet Gas Scrubber unit (which is required to remove sulphur oxides from the flue gas prior to carbon capture) generates an effluent stream that has elevated sulphate levels that cannot be reduced by the ETP.

13.6.46 The concentrations of sulphate that would be discharged to South Killingholme Drain following dilution with the existing Phillips 66 Humber Refinery discharge, in the absence of mitigation, are anticipated to be in the order of approximately 1,800 mg/l. A review of the literature available on ecotoxicity of sulphate to aquatic organisms and potential effects on aquatic ecosystems demonstrated that there is no certainty regarding the effect levels of sulphate to aquatic organisms, including fish and macroinvertebrates (see Phillips 66 Report to Inform HRA Appendix F).

13.6.47 Sulphate is not included in the indicative list of polluting substances in Annex II to the Industrial Emissions Directive (2010/75/EU) to be taken into account for setting emission limit values. However, freshwater organisms can be harmed by excessive sulphate concentrations, and this is reflected in the Environment Agency having an Environmental Quality Standard (EQS) of 400 mg/l for freshwaters. There is no EQS in place for estuaries and coastal waters.

13.6.48 Rosper Road Pools functions as a water storage area for the South Killingholme Drain catchment; its purpose is to store water when the system is tide locked to prevent flooding in the catchment. When the tide is in and there is no flow from South Killingholme Drain out into the Estuary, the water level in the drain rises and spills over a weir structure on the northern side of Rosper Road Pools, and then discharges back into the catchment as the tide falls. The frequency at which this system is in use depends on the weather i.e. if there is a period of heavy rainfall then water can be flowing into Rosper Road Pools on every high tide during that period.

13.6.49 The literature review found differing levels of recommended sulphate discharge to freshwaters that are considered acceptable from an environmental perspective, and only two states in the US (Illinois and Iowa) and Canadian British Columbia have published standards for water quality for this pollutant. The level of toxicity is affected by baseline conditions including the pH, conductivity and hardness ($CaCO_3$) of the receiving water. The review concluded that a level of ~1,000 mg/l of sulphate would be an appropriate maximum allowable concentration to protect aquatic life.

13.6.50 Despite the predicted high sulphate level at the point of discharge, it is unlikely that water entering Rosper Road Pools when the system is tide locked would be at the same level as that discharged, as when water flows into the Pools over the weir there are higher levels of water in the ditches and thus there would be some dilution. Chapter 9 (Water Environment and Flood Risk) predicts the Proposed Phillips 66 Development discharge would be diluted in South Killingholme Drain by around 40% at the point of discharge into Rosper Road Pools, reducing the sulphate concentration to around 1,000 mg/l. There would also not be regular routine operational discharge into the Pools, as the weir is not overtopped at high tide unless there are high levels of rainfall (although the regularity of weir overtopping is not monitored by the Internal Drainage Board). However, there remains a risk that on occasion, water containing an elevated sulphate level would enter the Pools. This may change the water chemistry, and result in adverse effects on the aquatic faunal assemblage on which SPA/ Ramsar waterbirds feed. As there is no baseline water chemistry data or aquatic invertebrate

data for Rosper Road Pools, it is difficult to establish what the effects of elevated sulphate would be in the aquatic environment, as the literature has identified a number of factors that affect sulphate toxicity to aquatic fauna, and thus what level would adversely affect the aquatic fauna of Rosper Road Pools and the consequently waterbirds that feed on them. Although only a small site, Rosper Road Pools plays an important role in providing alternative feeding, roosting and loafing habitat for waterbirds pushed off the nearby North Killingholme mudflats across the high tide, and is considered functionally linked to the SPA/ Ramsar. Any damage to this functionally linked habitat due to a depletion in the availability of aquatic feeding resources may result in the displacement of waterbirds, and therefore has the potential to adversely affect the SPA/ Ramsar waterbird assemblage.

13.6.51 As well as the lack of baseline data for Rosper Road Pools against which to undertake a quantitative assessment, there are uncertainties surrounding the acceptable level of sulphate discharge for the protection of the aquatic environment. A precautionary approach to the assessment has therefore been taken, without taking account of further mitigation to reduce sulphate discharge below 1,000 mg/l (see Section 13.7), the predicted increase is assessed as a moderate impact, resulting a **moderate adverse (significant)** effect on the Humber Estuary SPA/ SAC/ Ramsar.

13.6.52 As there is no EQS in place for estuaries and coastal waters, it is very difficult to determine a magnitude at which elevated sulphate levels may affect aquatic organisms in the Estuary. However, given that the discharge point is over 1 km downstream of the discharge point, it is reasonable to assume that there will be some dilution by the time the effluent reaches the Humber Estuary. There will also be significant dilution once it reaches the Estuary. Seawater contains about 2,700 mg/L of sulphate (Hitchcock, 1975) and therefore the level of sulphate in the wet gas scrubber effluent is below the naturally occurring levels. It is concluded that the elevated level of sulphate in the effluent discharge will not result in any discernible changes to the sulphate concentration of the Estuary, and therefore it can be concluded with certainty that this pathway will result in **negligible (non-significant)** effect on the integrity of the Humber Estuary SAC/ SPA/ Ramsar.

13.6.53 Other pollutants will be controlled through standard operational mitigation measures and controlled by the Environmental Permit and this will adequately minimise risk. It is therefore concluded that with the embedded measures to control pollution (except sulphate) during operation, there will be **negligible** (**non-significant**) effect on Humber Estuary SAC/ SPA/ Ramsar site habitats and the species they support.

## VPI Site

### Construction Phase

13.6.54 The assessment of impacts and effects is based on an assumption that all the habitats on Site will be lost or adversely impacted and that there is little or no opportunity for on-Site mitigation or compensation.

#### *Effects on Designated Sites*

##### Humber Estuary SAC/ SPA/ Ramsar Site/ SSSI

##### *Noise/ Visual Disturbance to Breeding SPA/ Ramsar Site/ SSSI Birds*

13.6.55 There is no suitable breeding habitat within the VPI Site for the qualifying breeding species of the SPA/ Ramsar site/ SSSI, which are bittern, marsh harrier, little tern and avocet.

13.6.56 Breeding avocet are known to be present on Rosper Road Pools LWS, which is approximately 150 m east of the Proposed VPI Development. There is therefore the potential for noise and visual disturbance to nesting avocet at Rosper Road Pools during the construction phase.

13.6.57 The Proposed VPI Development is approximately 150 m west of Rosper Road Pools on the western side of Rosper Road and the link road off the A160, which lie between the lagoon and the Proposed VPI Development. Although relatively close, the lagoon/ central islands on which the avocets are nesting are visually screened from construction activities by trees/ shrubs in the north-west corner of the nature reserve and along the western boundary to Rosper Road, as well as the tall mature hedgerow along the entire northern boundary.

13.6.58 The nature and scale of the temporary construction activities associated with the Proposed VPI Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This includes temporary construction activities in the AMEP DCO site to the north-east and the structures associated with the existing VPI Immingham CHP Plant to the immediate north of the Proposed VPI Development. It is envisaged that the plant, machinery, vehicles and structures used during construction will not result in any material change in the conditions currently surrounding the Rosper Road Pools. This is assessed as a **negligible** effect (**non-significant**).

13.6.59 Noise modelling has been undertaken and is presented in Chapter 6 (Noise and Vibration). Noise contour maps are provided in Appendix D to the HRA Reports. The noisiest activities during construction are associated with the site clearance works (vehicle movements etc.) as there will be no driven impact piling of foundations for the buildings on site; all piling will be done using Continuous Flight Auger (CFA) rigs, which do not produce the 'peaky' noise output that can be disruptive to birds. The modelled noise levels at the nearest part of Rosper Road Pools are in the 60–65 dB LAeq,T range and <60 dB LAeq,T across the open lagoon habitat. The predicted maximum noise level arising from construction activities on the nearest part of the VPI Site to Rosper Road Pools is <60 dB LAmax across the whole of Rosper Road Pools. Studies indicate that noise levels >84 dBA typically elicit a flight response in birds and the same research recommends that construction noise levels be kept below 70 dB to avoid excessive disturbance of birds. Given that the modelled levels are well below 70 dB LAeq,T/ LAmax, it is therefore concluded that nesting avocet and wintering/ passage waterbirds at Rosper Road Pools would not be disturbed. This is assessed as a **negligible** effect (**non-significant**).

### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds within SPA/ Ramsar Site/ SSSI*

13.6.60 The Proposed VPI Development is approximately 1.5 km inland from the nearest intertidal mudflats at North Killingholme Marshes Foreshore. At this distance it is reasonable to conclude there is no potential for direct noise or visual disturbance to waterbirds feeding, roosting and loafing on the mudflats as a result of construction activities.

13.6.61 There will be no driven impact piling for the construction of the Proposed VPI Development as all piling will be undertaken using a CFA piling rig. The noise modelling undertaken for the Proposed VPI Development confirms that piling noise will have attenuated to within ambient levels at the nearest areas of mudflats at North Killingholme Marshes. It is therefore concluded that there is no potential for noise disturbance to birds feeding, roosting and loafing on the mudflats at North Killingholme marshes. This is assessed as a **negligible** effect (**non-significant**).

### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds using Functionally-linked Land*

13.6.62 The Proposed VPI Development is on the opposite side of Rosper Road to fields used occasionally by numbers of curlew >1% Humber Estuary population threshold and which are considered functionally-linked land. Although relatively close, as discussed above in respect of potential disturbance to Rosper Road Pools, the nature and scale of the temporary construction activities associated with the Proposed VPI Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This includes temporary construction activities in the AMEP DCO site to the north-east, and the structures associated with the existing VPI Immingham CHP Plant to the immediate north of the Proposed VPI Development. It is envisaged that the plant, machinery, vehicles and structures used during construction will not result in any material change in the conditions currently surrounding the Rosper Road Pools.

13.6.63 Noise modelling has been undertaken and is presented in Chapter 6 (Noise and Vibration, ES Volume I). The noisiest activities during construction are associated with the site clearance works (vehicle movements etc.) as there will be no driven impact piling of foundations for the buildings on site; all piling will be done using CFA rigs, which do not produce the 'peaky' noise output that can be disruptive to birds. The modelled noise levels at the nearest functionally-linked field (Field 5) to the Proposed VPI Development are in the 60 – 65 dB LAeq,T range

and <60 dB LAeq,T across the majority of the field. Studies indicate that noise levels >84 dBA typically elicit a flight response in birds and the same research recommends that construction noise levels are kept below 70 dB to avoid excessive disturbance of birds. Given that the modelled levels are well below 70 dB LAeq,T/ LAmax, it is therefore concluded that wintering/ passage waterbirds using terrestrial fields east of Rosper Road would not be disturbed during the construction phase of the Proposed VPI Development. This is assessed as a **negligible** effect (**non-significant**).

13.6.64 In terms of visual impacts, the nature and scale of the temporary construction activities associated with the Proposed VPI Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road fields. This includes temporary construction activities in the AMEP DCO site to the north-east, and the structures associated with the existing VPI Immingham CHP Plant to the immediate north of the Proposed VPI Development. It is envisaged that the plant, machinery, vehicles and structures used during construction will not result in any material change in the conditions currently surrounding the Rosper Road fields. The hedgerows/ scattered trees along the eastern side of Rosper Road also provide some visual screening of traffic/ plant movement along Rosper Road and within the construction site. This is assessed as a **minor adverse** effect (**non-significant**).

### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds using AMEP Mitigation Land*

13.6.65 The Proposed VPI Development is very close to the consented AMEP 'Mitigation Area A' land, which is on the eastern side of Rosper Road directly opposite the existing VPI Immingham CHP Plant. This habitat was included within the AMEP DCO to mitigate extensive losses of functionally-linked land supporting overwintering/ passage waterbirds in numbers >1% of the Humber Estuary populations within the footprint of the AMEP development. However, this mitigation area was subsequently been permitted to be relocated to the Halton Marshes Wet Grassland Mitigation Area in a non-material change to the DCO. The former Mitigation Area A land will now be subject to further development associated with the AMEP scheme as part of a material amendment to the DCO. The Halton Marshes Wet Grassland Mitigation Area, which is north of Able UK's Humber Sea Terminal, has already been created. This habitat is approximately 4.5 km north of the Proposed VPI Development and therefore well outside the zone of influence of any noise/ visual disturbance associated with the Proposed VPI Development. This potential impact pathway is therefore scoped out.

### *Underwater Noise Disturbance to SAC/ Ramsar Site Marine Mammals and Fish*

13.6.66 All construction works for the Proposed VPI Development are > 1 km from the estuary, and over this distance it is reasonable to conclude that there would be no propagation of underwater noise such that the qualifying features could be significantly affected.

### *Direct Loss/ Damage to Qualifying Habitats or Habitats used by Qualifying Bird Species*

13.6.67 The Proposed VPI Development site itself is unsuitable as functionally-linked land for SPA/ Ramsar site birds as it is a mosaic of tall grassland, bare ground and dense/ scattered scrub. Moreover, given the distance between the designations and the Proposed VPI Development there is no pathway that could result in direct habitat loss or direct physical damage to any of the designated habitats. Similarly, there are no groundwater pathways over this distance through which the Proposed VPI Development could give rise to any effects on the groundwater dependent terrestrial ecosystems (GWTEs) of the sites.

### *Dust Smothering of Designated Habitats*

13.6.68 Given the distance of the designated habitats from the Proposed VPI Development (approximately 1.5 km), they are well outside the zone of influence of fugitive dust emissions from construction, which is approximately 50 m. There is therefore no potential for dust smothering of designated habitats.

### *Changes in Air Quality due to Construction Vehicle Road Traffic Movements*

13.6.69 The Humber Estuary SAC/ Ramsar is >200m from the affected road network and therefore in accordance with IAQM guidance, there is no requirement for an air quality assessment to be undertaken for construction road traffic movements. This pathway is therefore scoped out of the impact assessment.

13.6.70

### *Changes in Surface Water Quality due to Pollution/ Siltation*

There is the potential for pollution/ siltation of Humber Estuary via the surface water drainage network, into which surface water run-off from the Proposed VPI Development will outfall during construction however, standard environmental measures to control pollution to the drains during construction phase will adequately minimise risk. It is therefore concluded that with the embedded measures to control pollution/ siltation during construction, there will be negligible effect on Humber Estuary SAC/ SPA/ Ramsar site habitats and the species they support.

## North Killingholme Haven Pits SSSI

13.6.71 There will be no direct effects on the North Killingholme Haven Pits SSSI. Given that VPI Immingham CHP Plant, Lindsey Oil Refinery and Able UK Humber Port all lie between the VPI Site and the SSSI and the SSSI is over 2 km from the Proposed VPI Development, it is reasonable to conclude that there is no potential for noise/ visual disturbance to waterbirds using the SSSI as a result of construction activities.

## Rosper Road Pools LWS.

### *Noise/ Visual Disturbance to Breeding and Wintering Birds*

13.6.72 This potential impact has been assessed in respect of potential for impacts on breeding and wintering waterbirds using functionally-linked land to the Humber Estuary SPA/ Ramsar site/ SSSI within Rosper Road Pools LWS and was concluded to result in a **negligible** effect (**non-significant**).

### *Changes in Surface Water Quality due to Pollution/ Siltation*

13.6.73 The pools within the LWS are used for flood storage (the site is managed for flood attenuation by the IDB; there is therefore potential for pollution/ siltation of Rosper Road Pools via the surface water drainage network, into which surface water run-off from the Proposed VPI Development will outfall during construction. The hydrological connectivity between South Killingholme Drain (the main channel drainage the Site) is identified in ES Chapter 9 (Water and Flood Risk, ES Volume I) however, standard environmental measures to control pollution to the drains during construction phase will adequately minimise risk, as is required for compliance with environmental legislation. It is therefore concluded that with the embedded measures to control pollution/ siltation during construction, there will be a **negligible** effect (**non-significant**) on Rosper Road Pools LWS and the species it supports.

### *Changes in Air Quality due to Construction Vehicle Road Traffic Movements*

13.6.74 The air quality assessment has not modelled the construction road traffic movements for the Proposed VPI Development alone, because the maximum AADT is slightly lower, and therefore predicted emissions are not environmentally worse than those for the Proposed Phillips 66 Development alone. The conclusions of the assessment for the Proposed Phillips 66 Development therefore represent the worst-case scenario for the Proposed VPI Development alone.

13.6.75 The predicted concentration (PC) change for NOx is less than 70% of the AQAL, and it is therefore assessed to be an impact of negligible magnitude, resulting in a **negligible** (not significant) effect on the LWS.

13.6.76 The small temporary increase in N-deposition relative to the background concentration will result in a **negligible** (non-significant) effect on susceptible woodland habitat within Rosper Road Pools LWS.

### Eastfield Road Railway Embankment LWS

#### *Changes in Air Quality due to Construction Vehicle Road Traffic Movements*

13.6.77 This site is scoped into the air quality impact assessment as it is within 200m of the affected road network (see Chapter 6: Air Quality, ES Volume I). The site has been assessed against criteria for neutral grassland.

13.6.78 As stated above in respect of Rosper Road Pools LWS, the assessment for the Proposed Phillips 66 Development represents the worst-case scenario for the Proposed VPI Development, and the assessment conclusions in respect of potential air quality impacts on Eastfield Road Railway Embankment LWS are therefore similarly applicable.

13.6.79 The predicted concentration (PC) change for NOx is less than 70% of the AQAL, and it is therefore assessed to be an impact of negligible magnitude, resulting in a **negligible** (not significant) effect on the LWS.

13.6.80 The small temporary increase in N-deposition relative to the background concentration will result in a **negligible** (non-significant) effect on susceptible woodland habitat within Rosper Road Pools LWS.

### Eastfield Road Pit LWS

#### *Changes in Air Quality due to Construction Vehicle Road Traffic Movements*

13.6.81 This site is scoped into the air quality impact assessment as it is within 200m of the affected road network (see Chapter 6: Air Quality, ES Volume I). The site has been assessed against criteria for neutral grassland.

13.6.82 As stated above in respect of Rosper Road Pools LWS and Eastfield Road Railway Embankment LWS, the assessment for the Proposed Phillips 66 Development represents the worst-case scenario for the Proposed VPI Development, and the assessment conclusions in respect of potential air quality impacts on Eastfield Road Railway Embankment LWS are therefore similarly applicable.

13.6.83 The predicted concentration (PC) change for NOx is less than 70% of the AQAL, and it is therefore assessed to be an impact of negligible magnitude, resulting in a **negligible** (not significant) effect on the LWS.

13.6.84 The small temporary increase in N-deposition relative to the background concentration will result in a **negligible** (non-significant) effect on susceptible woodland habitat within Rosper Road Pools LWS.

### Other Local Wildlife Sites.

13.6.85 Burkinshaw's Covert LWS andMayflower Wood Meadow LWS were identified in the desk study as potentially within the zone of influence of the Proposed VPI Development however all are sufficiently distant from the VPI Site (> 0.5 km away) and are buffered by industrial land use. Both are designated primarily for the habitats they support, and the Proposed VPI Development will not have any direct impacts on these habitats. The effect on these sites is assessed as **negligible** (**non-significant**).

### *Loss of Trees/ Scrub*

13.6.86 There may be a need facilitation pruning and/or removal of scrub where the Proposed Developments overlap near the tree-lined railway. As in the case of the Phillips 66 Site described above, the area affected is likely to be small but may result in a minor loss of nesting habitat for some bird species. Were this to occur, the embedded mitigation measures will ensure full legal compliance. The effect is assessed as being **minor adverse** (**non-significant**).

### *Loss of Open Mosaic Habitat*

13.6.87 Site clearance will result in the permanent and irreversible loss of approximately 4 hectares of OMH, together with its botanical and invertebrate interest. It would also reduce the future

nesting opportunities for lapwing and little ringed plover. The effect is assessed as being **moderate adverse** (**significant**).

### *Loss of Grassland*

13.6.88 Site clearance will result in the permanent and irreversible loss of most if not all of the grassland on the VPI Site; approximately 8 hectares in total. Whilst these habitats are not of particular conservation importance in their own right, the loss will have an adverse effect on small heath butterfly, a S41 species, future nesting and foraging opportunities for a range of S41 bird species and foraging opportunities for local bats. Taken together, the effect is assessed as being **moderate adverse** (**significant**).

### *Loss of South Killingholme Drain Through VPI Site*

13.6.89 The South Killingholme Drain runs through the centre of the VPI development area and must be diverted to the south. The aim is to keep as much of the diverted drain open but a short section will be culverted. The loss will be permanent and irreversible, although the drain has low conservation value and does not support water vole or otter. The effect is assessed as being **minor adverse** (**non-significant**).

### *Loss of South Killingholme Drain Along Rosper Road*

13.6.90 A section of drain along the west side of Rosper Road will be culverted in order to create new highway access into the VPI Site. Whilst the loss will be permanent and irreversible, this ditch has low conservation value and does not support water voles. The effect is assessed as being **negligible** (**non-significant**).

### *Potential Effects on Small Heath Butterfly*

13.6.91 The loss of areas of finer (less rank) grassland will result in the permanent and irreversible loss of most if not all of the grassland and scrub on the VPI Site; approximately 8 ha in total. Whilst these habitats are not of conservation importance in their own right, their loss will have an adverse effect on small heath butterfly, an S41 species, leaving it with insufficient habitat to support a viable colony. Small heath is reported to be severe decline and so the potential permanent loss of a colony is assessed as being **moderate adverse** (**significant**).

### *Potential Effects on the Breeding Bird Assemblage*

13.6.92 Arboreal species are likely to continue to use the treeline along the railway, which is also likely to include some scrub however, there will be little or no viable nesting opportunities for future use by open habitat species, most notably little ringed plover (Schedule-1), lapwing, skylark and reed bunting (all S41). In total, habitat loss is likely to have a permanent and irreversible adverse effect on around a third of the species recorded as confirmed or probably breeding on the VPI Site. The effect is assessed as being **minor adverse** (**non-significant**).

### *Potential Effects on the Bat Assemblage*

13.6.93 There are no structures or trees suitable for use by roosting bats on or immediately adjacent to the VPI Site, and so no risk of damage or disturbance to a roost during construction. The loss of habitats will have a permanent and irreversible adverse effect on the biomass of invertebrate prey available to local bats, although activity levels recorded in the acoustic bat surveys do not indicate that the VPI Site is particularly productive for any species. The retained treeline along the railway, and South Killingholme Drain are both likely to continue to provide foraging opportunities and a degree of linear habitat connectivity for what is likely to be a low number of individual bats using the VPI Site. Bats are highly mobile animals and based on the low levels of activity recorded and the assemblage present, are likely to be largely resilient to the effects of the Proposed VPI Development, but due to a loss of foraging opportunities, the effect is assessed as being **minor adverse** (**non-significant**).

## Operation Phase

### *Effects on Designated Sites*

#### Humber Estuary SAC/ SPA/ Ramsar Site/ SSSI

##### *Noise/ Visual Disturbance to Breeding SPA/ Ramsar Site/ SSSI Birds*

13.6.94 The Proposed VPI Development is approximately 1.5 km inland from the nearest intertidal mudflats at North Killingholme Marshes Foreshore. At this distance it is reasonable to conclude there is no potential for direct noise or visual disturbance to waterbirds feeding, roosting and loafing on the mudflats as a result of operational activities.

13.6.95 Breeding avocet are known to be present on Rosper Road Pools LWS, which is approximately 150 m east of the Proposed VPI Development however, the existing vegetation around the Pools, as well as Rosper Road, lies between the Proposed VPI Development and Rosper Road Pools, and it is therefore reasonable to conclude that there is no potential for visual disturbance to birds using Rosper Road Pools during operation.

13.6.96 The nature and scale of the operational activities associated with the Proposed VPI Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This includes the operation of the existing VPI CHP Immingham Plant to the north of the Proposed VPI Development, the Lindsey Oil Refinery to the west and ongoing construction activities within the consented AMEP development area to the north. It is envisaged that the plant, machinery, vehicles and structures used during operation will not result in any material change in the conditions currently surrounding the Rosper Road Pools. This is assessed as a **negligible** effect (**non-significant**).

13.6.97 Noise modelling has been undertaken and is presented in Chapter 7 (Noise and Vibration, ES Volume I). The modelled noise levels at the nearest part of Rosper Road Pools are <60 dB LAeq,T across the open lagoon habitat. As discussed in respect of operational noise, studies indicate that noise levels >84 dBA typically elicit a flight response in birds and the same research recommends that construction noise levels are kept below 70 dB to avoid excessive disturbance of birds. Given that the modelled operational noise levels are well below 70 dB LAeq,T/ LAmax, it is therefore concluded that nesting avocet at Rosper Road Pools would not be disturbed. This is assessed as a **negligible** effect (**non-significant**).

##### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds within SPA/ Ramsar Site/ SSSI*

13.6.98 The Proposed VPI Development is approximately 1.5 km inland from the nearest intertidal mudflats at North Killingholme Marshes Foreshore. At this distance it is reasonable to conclude there is no potential for direct noise or visual disturbance to waterbirds feeding, roosting and loafing on the mudflats as a result of operational activities. This is assessed as a **negligible** effect (**non-significant**).

##### *Noise/ Visual Disturbance to Wintering and Passage Waterbirds using Functionally-linked Land*

13.6.99 Noise modelling has been undertaken and is presented in Chapter 7 (Noise and Vibration, ES Volume I). The modelled noise levels at the nearest functionally-linked land associated with Rosper Road Fields (Field 5) are <60 dB LAeq,T across the open lagoon habitat. As discussed in respect of construction noise, studies indicate that noise levels >84 dBA typically elicit a flight response in birds and the same research recommends that construction noise levels are kept below 70 dB to avoid excessive disturbance of birds. Given that the modelled operational noise levels are well below 70 dB LAeq,T/ LAmax, it is therefore concluded that nesting avocet at Rosper Road Pools would not be disturbed.

13.6.100 In terms of visual impacts, the nature and scale of the temporary construction activities associated with the Proposed VPI Development are not significantly different from on-going industrial activities within the area surrounding the Rosper Road fields. This includes temporary construction activities in the AMEP DCO site to the north-east, and the structures associated with the existing VPI Immingham CHP Plant, and the Lindsey Oil Refinery to the north-west. It is envisaged that the plant, machinery, vehicles and structures present during

operation will not result in any material change in the conditions currently surrounding the Rosper Road fields. The hedgerows/ scattered trees along the eastern side of Rosper Road also provide some visual screening of traffic/ plant movement along Rosper Road and within the operational site.

13.6.101 It is reasonable to assume that any SPA/ Ramsar site waterbirds roosting, loafing and/or foraging in fields on the west side of Rosper Road are habituated to the general industrial nature (and its associated noise and visual impact from vehicle traffic, sirens, railway operations, chimney stacks, pipe racks, buildings etc.) of the surrounding area. This is assessed as a **negligible** effect (**non-significant**).

### *Changes in Air Quality due to Operational Emissions*

13.6.102 Intertidal habitats are not susceptible to the effects of changes in air quality arising from stack emissions during operation (increased nitrogen, ammonia and acid deposition) because of their regular tidal inundation. Subtidal habitats have similarly been scoped out.

13.6.103 Air quality modelling has been undertaken for operational emissions from the Proposed VPI Development and is presented in ES Chapter 6 (Air Quality, ES Volume I). The impact of emissions on sensitive ecological receptors are quantified in two ways:

- direct impacts: due to increases in atmospheric pollutant concentrations, which are assessed against defined 'critical levels'; and
- indirect impacts: deposition of acids and nutrient nitrogen to the ground surface, which are assessed against defined 'critical loads'.

13.6.104 The critical levels for the protection of vegetation and ecosystems are defined as "*concentrations of pollutants in the atmosphere above which direct adverse effects on...plants [and] ecosystems...may occur according to present knowledge," and critical loads are defined as "a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*" (Centre for Ecology and Hydrology (CEH) and Air Pollution Information System (APIS) website (2022). Critical levels and loads are set out in detail in Section 6.2 of ES Chapter 6 (Air Quality).

13.6.105 The air quality assessment has considered the modelled effects of nitrogen dioxide $NO_2$ (annual mean/ daily mean), sulphur dioxide $SO_2$ (annual mean) and ammonia $NH_3$ (annual mean) emissions from the Proposed Development on the worst impacted designated site receptor. All impacts are considered to be insignificant at the ecological receptors as they do not exceed the 1% screening threshold for Process Contributions (PC), except for annual average nitrogen oxides NOx at the worst-case impacted receptor (Humber Estuary (OE1)). The increase in the annual average NOx PC at this receptor represents +4.7% of the AQAL for the Proposed VPI Development assessment.

13.6.106 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 NOx) 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. NOx 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 NOx are reached.

13.6.107 The guideline atmospheric concentration of NOx 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 NOx in N deposition and in particular in growth stimulation and inhibition. If the total NOx 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 NOx could be an issue and should be investigated.

13.6.108 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 NOx. Unlike NOx, 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).

13.6.109 The air quality impact assessment has modelled a number of receptors within the Humber Estuary SAC/ SPA/ Ramsar site/ SSSI that are sensitive to NOx emissions. The nearest to the Proposed VPI Development is pioneer lower and upper saltmarshes (receptor OE1e in ES Appendix 6B), which are approximately 1.8 km east of the Proposed VPI Development. At receptor OE1e, the process contribution resulting from the maximum annual mean NOx emissions is 2.1% of the critical level for the Humber Estuary SAC/ SPA/ Ramsar site (ES Appendix 6B, Table 6B.32). 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. NOx emissions to receptor OE1d also exceed the 1% screening threshold, but this habitat is 'northern wet heath' and is not a designated feature of the SAC; it is therefore not considered further.

13.6.110 Although ammonia was screened out as a pollutant in the atmosphere, it has been taken into account in the nitrogen deposition calculations. For saltmarsh, the UK Air Pollution Information System (APIS) provides a Critical Load range of 20-30 kg/ha/yr and nitrogen inputs have been experimentally demonstrated to have an effect on overall species composition of saltmarsh. However, the Critical Loads on APIS are relatively generic for each habitat type and cover a wide range of deposition rates. They do not (and are not intended to) take other influences (to which the habitat on a given site may be exposed) into consideration.

13.6.111 Moreover, it is important to note from APIS that the experimental studies which underlie conclusions regarding the sensitivity of saltmarsh have *'… neither used very realistic N doses nor input methods i.e., they have relied on a single large application more representative of agricultural discharge'*, which is far in excess of anything that would be deposited from atmosphere. Therefore, APIS indicates that determining which part of the Critical Load range to use for saltmarsh requires expert judgment. Overall, there is good reason to believe the upper part of the critical load range (30 kgN/ha/yr) may be more appropriate than the lower part (20 kgN/ha/yr) for some saltmarsh communities.

13.6.112 Generally, nitrogen inputs from the air are not as important as nitrogen from other sources. Effects of nitrogen deposition from atmosphere are likely to be dominated by much greater impacts from marine or agricultural sources. This is reflected on APIS itself, which states regarding saltmarsh that '*Overall, N deposition [from atmosphere] is likely to be of low importance for these systems as the inputs are probably significantly below the large nutrient loadings from river and tidal inputs'*. Another mitigating factor is that the nature of intertidal saltmarsh in the Humber Estuary means that there is daily flushing from tidal incursion. This is likely to further reduce the role of nitrogen from atmosphere in controlling botanical composition.

13.6.113 For all receptors, except OE1e/ OE1d, the predicted annual average NOx concentrations are below 1% of the AQAL and therefore are considered insignificant. It is important to note that the background concentrations already include the existing contribution from the VPI Site, and therefore it is considered that the actual PECs will be below these values. However, for both annual average impacts and daily (24-hour) average impacts, the PEC from NOx at receptor OE1 does not exceed the 100% threshold (71%/ 56% respectively – see Appendix 6B: Table 6B.13, ES Volume II).

13.6.114 It is therefore assessed that even with the elevation of NOx above the 1% screening threshold at receptor OE1, when this is considered in greater detail there remains no exceedance of the critical level for saltmarsh. NOx emissions from the Proposed VPI Development are therefore assessed to result in a **minor adverse** effect (**non-significant**).

### *Changes in Air Quality due to Operational Vehicle Road Traffic Movements*

13.6.115 The Humber Estuary SAC/ Ramsar is >200m from the affected road network and therefore in accordance with IAQM guidance, there is no requirement for an air quality assessment to be undertaken for operational road traffic movements. This pathway is therefore scoped out of the impact assessment.

### *Changes in Surface Water Quality due to Pollution*

13.6.116 There is the potential for pollution of the Humber Estuary via the surface water drainage network, into which surface water run-off from the Proposed VPI Development will outfall during operation. However, standard environmental measures to control pollution to the drains during operation will adequately minimise risk, as this is required for compliance with environmental legislation. It is therefore concluded that with the embedded measures to control pollution/ siltation during operation, there will be **negligible** (**non-significant**) effect on Humber Estuary SAC/ SPA/ Ramsar site habitats and the species they support.

## Cumulative Effects of The Proposed Developments

13.6.117 The following pathways by which the construction and operation of both the Proposed Developments could potentially give rise to cumulative effects on ecology receptors have been identified:

- cumulative noise impacts to waterbirds using functionally-linked land to the Humber Estuary SPA/ SAC/ Ramsar site/ SSSI during construction;
- cumulative air quality impacts to Rosper Road Pools LWS, Eastfield Road Railway Embankment LWS and Eastfield Road Pit LWS due to emissions from road traffic during construction;
- cumulative noise impacts to waterbirds using functionally-linked land to the Humber Estuary SPA/ SAC/ Ramsar site/ SSSI during operation;
- cumulative air quality impacts to terrestrial habitats within the Humber Estuary SPA/ SAC/ Ramsar site during operation.

### *Cumulative Noise Impacts (Construction)*

13.6.118 Noise modelling was carried out for the construction phase of the Proposed Developments, which predicted that that construction noise levels will have attenuated to below 55 dB LAeq and 55 dB LAmax across Rosper Road Pools and the surrounding terrestrial fields east of Rosper Road. This is assessed as a **negligible** effect (**non-significant**).

13.6.119 The nature and scale of the temporary construction activities associated with the Proposed Developments are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This pathway is therefore screened out.

### *Cumulative Air Quality Impacts (Construction)*

**Rosper Road Pools LWS**

13.6.120 The air quality impact assessment for the construction phases of both the Proposed Phillips 66 Development and the Proposed VPI Development are considered under DS Scenario 1 and DS Scenario 2, where peak traffic flows during construction have been modelled ((see Chapter 6: Air Quality, Appendix 6A, ES Volume II).

*DS Scenario 1*

13.6.121 The background $NO_x$ level at the LWS is currently 17.5 µg/m$^3$. The future baseline annual mean NOx is 19.8 µg/m$^3$ in 2025. The maximum predicted change in Annual Mean $NO_x$ due to construction traffic emissions in DS Scenario 1 is <0.1 µg/m$^3$, which is a change of 0.3% of the Air Quality Assessment Level (AQAL). As the predicted concentration (PC) change is less than 70% of the AQAL, it is assessed to be an impact of negligible magnitude, resulting in a **negligible** (not significant) effect on the LWS.

13.6.122 The background rate of N-deposition at the LWS is 20.4 kgN/ha/yr. The future baseline annual mean N-deposition at the LWS is 20.7 kgN/ha/yr. As there are no published critical loads for non-statutory designated sites, the lowest appropriate critical load by habitat type has been applied to the air quality assessment. The maximum predicted change in deposited nitrogen due to construction traffic emissions is <0.1 kgN/ha/year, which is a change of <0.1% of the relevant AQAL. Despite the small increase in predicted N deposition due to construction traffic emissions, the air quality assessment has assigned a 'moderate' impact magnitude; however, this is entirely due to the high baseline N-deposition, which is well above the critical load for the habitat type present and consequently it already exceeds the AQAL. The 70% threshold is not intended as a damage threshold, and IAQM guidance acknowledges that for nitrogen "….*background values are high over much of the UK and it is unlikely there will be many occasions where the* PEC [Predicted Environmental Concentration] *is less than 70%*". It is therefore concluded that the small temporary increase in N-deposition relative to background concentration will result in a **negligible** (non-significant) effect on susceptible woodland habitat within Rosper Road Pools LWS.

*DS Scenario 2*

13.6.123 The maximum predicted change in Annual Mean $NO_x$ due to construction traffic emissions in DS Scenario 2 is 0.2 µg/m³, which is a change of 0.6% of the Air Quality Assessment Level (AQAL). As the predicted concentration (PC) change is less than 70% of the AQAL, it is assessed to be an impact of negligible magnitude, resulting in a **negligible** (not significant) effect on the LWS.

13.6.124 The maximum predicted change in deposited nitrogen due to construction traffic emissions in DS Scenario 2 is 0.02 kgN/ha/year, which is a change of 0.2% of the relevant AQAL. It is therefore concluded that the small temporary increase in N-deposition relative to background concentration will result in a **negligible** (non-significant) effect on susceptible woodland habitat within Rosper Road Pools LWS.

**Eastfield Road Railway Embankment LWS**

*DS Scenario 1*

13.6.125 The background $NO_x$ level at the LWS is 15.7 µg/m³. The future baseline annual mean NOx is 18.8 µg/m³ in 2025. The maximum predicted change in $NO_x$ due to construction traffic emissions is 0.7 µg/m³, which is a change of 2.2% of the Air Quality Assessment Level (AQAL). As the predicted concentration (PC) change is less than 70% of the AQAL, it is assessed to be an impact of negligible magnitude, resulting in a **negligible effect (not significant)** on the LWS.

13.6.126 The background rate of N-deposition at the LWS is 20.4 kgN/ha/yr. The future baseline annual mean N-deposition at the LWS is 20.8 kgN/ha/yr. The maximum predicted change in deposited nitrogen due to construction traffic emissions in DS Scenario 2 is 0.1 kgN/ha/year, which is a change of 1.2% of the relevant AQAL. Despite the small increase in predicted N deposition due to construction traffic emissions, the air quality assessment has assigned a 'moderate' impact magnitude. However, as discussed above in respect of Rosper Road Pools LWS, this is entirely due to the high baseline N-deposition and it is concluded that the small temporary increase in N-deposition relative to the background concentration will result in a **negligible** (non-significant) effect on the LWS.

*DS Scenario 2*

13.6.127 The maximum predicted change in Annual Mean $NO_x$ due to construction traffic emissions in DS Scenario 2 is 0.5 µg/m³, which is a change of 1.7% of the Air Quality Assessment Level (AQAL). As the predicted concentration (PC) change is less than 70% of the AQAL, it is assessed to be an impact of negligible magnitude, resulting in a **negligible** (not significant) effect on the LWS.

13.6.128 The maximum predicted change in deposited nitrogen due to construction traffic emissions in DS Scenario 2 is 0.07 kgN/ha/year, which is a change of 0.9% of the relevant AQAL. It is therefore concluded that the small temporary increase in N-deposition relative to background

concentration will result in a **negligible** (non-significant) effect on susceptible woodland habitat within Rosper Road Pools LWS.

**13.6.129 <u>Eastfield Road Pit LWS</u>**

*DS Scenario 1*

13.6.130 The background $NO_x$ level at the LWS is 15.7 µg/m$^3$. The future baseline annual mean NOx is 19.9 µg/m$^3$ in 2025. The maximum predicted change in $NO_x$ due to construction traffic emissions is 1 µg/m$^3$, which is a change of 3.2% of the Air Quality Assessment Level (AQAL). As the predicted concentration (PC) change is less than 70% of the AQAL, it is assessed to be an impact of negligible magnitude, resulting in a **negligible effect (not significant)** on the LWS.

13.6.131 The background rate of N-deposition at the LWS is 20.4 kgN/ha/yr. The future baseline annual mean N-deposition at the LWS is 21.6 kgN/ha/yr. The maximum predicted change in deposited nitrogen due to construction traffic emissions in DS Scenario 1 is 0.3 kgN/ha/year, which is a change of 3% of the relevant AQAL. Despite the small increase in predicted N deposition due to construction traffic emissions, the air quality assessment has assigned a 'major' impact magnitude. However, as discussed above in respect of Rosper Road Pools LWS and Eastfield Road Railway Embankment LWS, this is entirely due to the high baseline N-deposition and it is concluded that the small temporary increase in N-deposition relative to the background concentration will result in a **negligible** (non-significant) effect on the LWS.

*DS Scenario 2*

13.6.132 The background $NO_x$ level at the LWS is 15.7 µg/m$^3$. The future baseline annual mean NOx is 19.9 µg/m$^3$ in 2025. The maximum predicted change in $NO_x$ due to construction traffic emissions is 0.7 µg/m$^3$, which is a change of 2.4% of the Air Quality Assessment Level (AQAL). As the predicted concentration (PC) change is less than 70% of the AQAL, it is assessed to be an impact of negligible magnitude, resulting in a **negligible effect (not significant)** on the LWS.

13.6.133 The maximum predicted change in deposited nitrogen due to construction traffic emissions in DS Scenario 2 is 0.21 kgN/ha/year, which is a change of 2.1% of the relevant AQAL. Despite the small increase in predicted N deposition due to construction traffic emissions, the air quality assessment has assigned a 'major' impact magnitude. However, as discussed above in respect of Rosper Road Pools LWS and Eastfield Road Railway Embankment LWS, this is entirely due to the high baseline N-deposition and it is concluded that the small temporary increase in N-deposition relative to the background concentration will result in a **negligible** (non-significant) effect on the LWS.

## *Cumulative Noise Impacts (Operation)*

13.6.134 Noise modelling was carried out for the operational phase of the Proposed Developments, which predicted that that construction noise levels will have attenuated to below 55 dB LAeq and 55 dB LAmax across Rosper Road Pools and the surrounding terrestrial fields east of Rosper Road. This is assessed as a **negligible** effect (**non-significant**).

13.6.135 The nature and scale of the operational activities associated with the Proposed Developments are not significantly different from on-going industrial activities within the area surrounding the Rosper Road Pools. This pathway is therefore screened out.

## *Cumulative Air Quality Impacts (Operation)*

13.6.136 There are no in-combination exceedances of the 1% Critical Load screening threshold for NOx, $SO_2$ and ammonia. There is therefore no potential for in-combination effects on designated habitats as a result of these emissions from the two developments operating together.

13.6.137 Acid deposition resulting from the two Proposed Developments operating together is modelled to reduce compared to the baseline, which represents a slight benefit.

13.6.138 The air quality modelling indicates two places within the Humber Estuary where in-combination contribution from the two Proposed Developments operating together will exceed 1% of the Critical Load for nitrogen deposition (receptors OE1d and OE1e) (Appendix 6B, Table 6B.44, ES Volume II). As discussed, OE1d is heathland which is not a designated feature of the Humber Estuary SAC, and it is therefore not considered further.

13.6.139 At receptor OE1e (saltmarsh) where the Critical Load for this habitat is exceeded and the contribution of the two Proposed Developments (driven by the contribution of the Proposed VPI Development) is 4.8% of the critical load. However, paragraph 4.25 of Natural England guidance indicates that the simple fact that '1% of the Critical Load threshold' is exceeded doesn't necessarily mean an adverse effect on integrity will occur.

13.6.140 For saltmarsh, the UK Air Pollution Information System (APIS) provides a Critical Load range of 20-30 kg/ha/yr and nitrogen inputs have been experimentally demonstrated to have an effect on overall species composition of saltmarsh. However, the Critical Loads on APIS are relatively generic for each habitat type and cover a wide range of deposition rates. They do not (and are not intended to) take other influences (to which the habitat on a given site may be exposed) into consideration.

13.6.141 It is therefore assessed that even with the in-combination elevation of nitrogen deposition above the 1% screening threshold, the Process Contribution (PC) from the two Proposed Developments is insignificant at 0.97 kg N/ ha/ yr compared to a Predicted Environmental Concentration (PEC) of 20.9 kg N/ ha/ yr, which is towards the lower end of the critical load range for saltmarsh. It is therefore concluded that the in-combination effects of changes in air quality (arising from nitrogen deposition) from operation of the Proposed VPI Development with the Proposed Phillips 66 Development will result in **minor adverse** effect (**non-significant**).

13.6.142 Operational traffic emissions have not been subject to air quality modelling because the operational AADT flows do not exceed the IAQM screening criteria.

# 13.7 Mitigation and Enhancement Measures

13.7.1 Both applications include a commitment to achieve 10% Biodiversity Net Gain (BNG). As there are insufficient opportunities to meet the 10% BNG commitment on land within the Sites; an 'off-site' solution will be required, each to be delivered independently.

13.7.2 The BNG baseline and post-intervention scenarios have been calculated for each of the Proposed Developments using Defra Metric v3.1. These are presented in Biodiversity Net Gain Reports for each of the Proposed Developments, submitted with each planning application.

13.7.3 The application of the new Defra metric to calculate BNG and the subsequent mechanisms for delivery are in their infancy, and BNG discussions to finalise a solution for each of the Proposed Developments are progressing at different speeds, due largely to the variance in BNG liabilities and the challenges in identifying land for off-site solutions. Progress to date has involved informal discussions with a range of stakeholders, and has been informed by the 2019 CIRIA publication; *Biodiversity net gain. Good practice principles for development: A practical guide* (CIRIA, 2019).

13.7.4 As either solution could be delivered independently of work on the Sites (and so avoid penalties incurred by delays), the implementation of each BNG solution can commence as soon as all necessary approvals are in place. As such, an assumption is made that the beneficial outcomes are likely to be delivered within the construction phase of each of the Proposed Developments. This assumption is carried forward into the assessment of residual effects.

13.7.5 Whilst the precise solutions are still being discussed, there is confidence that the BNG solution for each of the Proposed Developments will fully mitigate any and all adverse effects identified in the EcIA and provide requisite habitat compensation and enhancements measures, together with a programme of management and monitoring in order to meet the BNG obligations.

13.7.6 It is anticipated that each solution will be delivered through a Biodiversity Enhancement and Management Plan (BEMP) to be prepared and agreed with the local planning authority prior to the commencement of work.

13.7.7 Desulphurisation (deSOx) treatment of FCC flue gas will be used to reduce the effluent sulphate concentration at the point of discharge from the Humber Refinery to South Killingholme Drain by around 50% but beyond this no viable options for sulphate treatment have been identified. To inform the applicability of any mitigation for impacts on Rosper Road Pools, it will be necessary to obtain baseline data for its water chemistry and aquatic invertebrate assemblage to inform further assessment. However, it is indicated in the literature review that an appropriate maximum allowable concentration of sulphate would be ~1,000 mg/l, and this would be achieved using deSOx. Phillips 66 will also undertake collection of further baseline data, as well as a quantitative water quality monitoring of Rosper Road Pools.

# 13.8 Residual Effects and Conclusions

## Overview

13.8.1 As previously described in Section 13.7, as both Proposed Developments necessitate off-site BNG solutions that can be implemented independently of work on the Sites (and so avoid penalties in the Metric incurred by delays), an assumption is made in the assessment of residual effects that the beneficial outcomes will be delivered within the construction phase of each of the Proposed Developments.

## Phillips 66 Site

### Construction

13.8.2 The effects during construction are limited to the loss of short section of hedgerow on Eastfield Road and a few small trees, and are assessed as minor adverse (non-significant). It is concluded that with the embedded mitigation measures in place and the implementation of measures to achieve 10% BNG these effects can be mitigated in full, with the overall effect during construction assessed as being **minor beneficial** (**non-significant**). No residual effects are anticipated.

### Operation

13.8.3 Treatment of FCC flue gas through the use of deSOx will reduce sulphate levels in the Proposed Phillips 66 Development effluent below the maximum concentration indicated as appropriate in the literature search. It is therefore assessed that with mitigation, the residual effect on Rosper Road Pools and consequently on the Humber Estuary SAC/ SPA/ Ramsar will be **negligible (non-significant)**.

13.8.4 It is concluded that with the embedded mitigation measures in place, no residual effects are anticipated during the operational phase of the Proposed Phillips 66 Development.

## VPI Site

### Construction

13.8.5 The effects during construction of the Proposed VPI Development comprise the permanent loss around 10 ha of habitat that supports invertebrates (most notably small heath butterfly), and nesting birds. The overall effect is assessed as being moderate adverse (significant). It is concluded that with the embedded mitigation measures in place and the implementation of measures to achieve 10% BNG these effects can be mitigated in full, with an overall effect during construction assessed as being **moderate beneficial** (**significant**). No residual effects are anticipated.

### Operation

13.8.6 It is concluded that with the embedded mitigation measures in place, no residual effects are anticipated during the operational phase of the Proposed VPI Development.

**Table 13.15: Proposed Phillips 66 Development - summary of significant effects**

| Phase | Description of Effect | Significance of Effect (Before Mitigation) | Mitigation Measures | Significance of Effect (After Mitigation) | Duration (short/ medium/ long term) and Reversibility |
|---|---|---|---|---|---|
| Construction | No significant effects anticipated | | | | |
| Operation | Change in water quality due to elevated level of sulphate in effluent discharge to South Kililngholme Drain | Moderate adverse (significant) | Desulphurisation of flue gas to reduce effluent sulphate levels below 1,000 mg/l | Negligible (not significant) | Long term, irreversible |
| Decommissioning | No significant effects anticipated | | | | |

**Table 13.16: Proposed VPI Development - Summary of significant effects**

| Phase | Description of Effect | Significance of Effect (Before Mitigation) | Mitigation Measures | Significance of Effect (After Mitigation) | Duration (short/ medium/ long term) and Reversibility |
|---|---|---|---|---|---|
| Construction | Loss of Open Mosaic Habitat | Moderate adverse (significant) | Creation of new habitat under BNG. | Moderate beneficial (significant) | Short term, reversible |
| | Loss of grassland/ scrub habitat (collectively as habitat for small heath butterfly, nesting birds and foraging bats) | Moderate adverse (significant) | Creation of new habitat under BNG. | Moderate beneficial (significant) | Short term, reversible |
| | Loss of small heath butterfly colony | Moderate adverse (significant) | Creation of new habitat under BNG. Possible translocation of pupa/eggs. | Moderate beneficial (significant) | Short term, reversible |
| Operation | No significant effects anticipated | | | | |

| Phase | Description of Effect | Significance of Effect (Before Mitigation) | Mitigation Measures | Significance of Effect (After Mitigation) | Duration (short/ medium/ long term) and Reversibility |
|---|---|---|---|---|---|
| Decommissioning | No significant effects anticipated | | | | |

**Table 13.17: Proposed Developments Combined - Summary of significant effects**

| Phase | Description of Effect | Significance of Effect (Before Mitigation) | Mitigation Measures | Significance of Effect (After Mitigation) | Duration (short/ medium/ long term) and Reversibility |
|---|---|---|---|---|---|
| Construction | Loss of Open Mosaic Habitat (within VPI Site) | Moderate adverse (significant) | Creation of new habitat under BNG. | Moderate beneficial (significant) | Short term, reversible |
| | Loss of grassland/ scrub habitat (collectively as habitat for small heath butterfly, nesting birds and foraging bats) (within VPI Site) | Moderate adverse (significant) | Creation of new habitat under BNG. | Moderate beneficial (significant) | Short term, reversible |
| | Loss of small heath butterfly colony (within VPI Site) | Moderate adverse (significant) | Creation of new habitat under BNG. Possible translocation of pupa/eggs. | Moderate beneficial (significant) | Short term, reversible |
| Operation | Change in water quality due to elevated level of sulphate in effluent discharge to South Kililngholme Drain from Phillips 66 Site | Moderate adverse (significant) | Desulphurisation of flue gas to reduce effluent sulphate levels below 1,000 mg/l | Negligible (not significant) | Long term, irreversible |
| Decommissioning | No significant effects anticipated | | | | |

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